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ABSTRACT

In 1995, nearly three-quarters of a million high school dropouts, age 16 and above, took the General Educational Development (GED) tests in pursuit of alternative secondary certification. The GED performs the following functions: stimulate human capital investment; measure and assess cognitive skills; certify dropouts with specified skill and knowledge levels; and build dropouts' confidence. Accordingly, GED recipients are much more likely to participate in postsecondary education and vocational training than are other dropouts. Although the grade-point averages of GED recipients and high school graduates enrolled in postsecondary education tend to converge over time, high school graduates are much more likely to complete their postsecondary education than GED recipients are. In controlled comparisons, a GED had little effect on labor force participation or unemployment but was positively associated with gains in full-time employment. Studies have shown that GED recipients earn more than other dropouts but less than high school graduates. Although GED recipients had no earnings advantage over dropouts in the short term, their relative earnings increased over time. (The bibliography contains 215 references. Appended are the following: evidence from Wisconsin regarding GED norming; seven tables; discussion of technical issues; and summary of GED follow-up surveys.) (MN)

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Educational and Labor Market Performance of GED Recipients

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Research Synthesis

Educational and Labor Market Performance of GED Recipients

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February 1998

This study is intended to promote the exchange of ideas among researchers and policy makers. The views expressed in it are part of ongoing research and analysis and do not necessarily reflect the position of the U.S. Department of Education.

PREFACE

Often it is hard to tell what conclusions can be drawn from education research studies, because the studies on a given subject have not been examined systematically as a body of research. Analyses conducted at different times with different populations and different research methods often yield apparently inconsistent conclusions about the same subject. Given ambiguous research findings, advocates of one position or another may promote those that support their views, while ignoring or minimizing contrary findings. In such circumstances, researchers, policy makers, and practitioners, such as teachers and administrators, may lack the comprehensive, balanced, objective information they need. While many good syntheses of education research have been produced over the years, many topics have not yet been covered.

In response to this need, the National Library of Education (NLE) has undertaken a series of research syntheses on issues of public concern in education. Based on published literature identified through traditional bibliographic searches, ERIC, and other Internet sources, and on unpublished Ph.D. dissertations and research reports available to NLE, the syntheses are designed to be empirical, even-handed, and as comprehensive as possible.

This study of the performance of General Educational Development (GED) recipients is the first synthesis in the series. The result of a great deal of careful research, it should be especially useful to those concerned with the education of adults and out-of-school youth.

We look forward to the new research syntheses to be provided in the future.

Blane Dessy
Executive Director
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Executive Summary

Background

In 1995 almost three-quarters of a million high school dropouts, age 16 and above, took the General Educational Development (GED) Tests, seeking the most widely recognized form of alternative secondary certification in the United States. The half million who passed it were awarded high school equivalency diplomas, about one-sixth of all the high school diplomas issued in that year.

GED examinees say that they take the tests primarily to get access to more education and to improve their job prospects. How successful are those who attain the GED credential? How does their performance in postsecondary education and the job market compare with that of regular high school graduates? With that of other high school dropouts? And what relation, if any, does GED certification have to the outcomes in these arenas? This study examines 50 years of research that addresses these and related questions.

The GED Tests were developed for the U.S. Army during World War II. At that time, the Roosevelt administration favored federal support for the college education of returning veterans, but many service members lacked the high school diplomas necessary to enter college. The granting of diplomas for wartime service had been tried after World War I, but colleges and universities came to oppose this practice. As an alternative, the American Council for Education (ACE) proposed testing veterans to determine competence for college. In 1942, test experts working for the Army selected five tests from the Iowa Test of Educational Development to form the first General Educational Development Tests. The tests reflected the emphasis of progressive educators on learning related to everyday life rather than on formal academics.

In the 1940s, GED test takers were mainly veterans and service members, and the test results were used mainly for college admissions. After the War, however, the tests were also administered to civilians, and states began to award high school credentials for passing the tests. By 1959, civilian test takers outnumbered veterans and service members.

From the beginning, the GED test battery has contained five different exams—writing, interpretation of literature, math, social studies, and science—though the content of the tests has changed. As a rule, the tests present written passages and multiple choice questions about the passages. They also provide additional information needed to answer the questions, such as mathematical formulas.

The American Council for Education's GED Testing Service produces and administers the tests, and its Commission on Educational Credit and Credentials sets the minimum passing standards. Above the minimums, states are free

to set their own conditions for passing the GED and awarding credentials. The original wartime passing standards were in place until 1982, when the ACE commission raised them. The commission raised the standards again in 1997.

In the years during and immediately after the war, the overwhelming majority of veterans who took the GED passed it. For the mostly civilian examinees who took the test between 1974 and 1995, the median yearly pass rate was 71.5 percent. However, the *eventual* pass rate for a cohort of initial test takers is probably somewhat higher, because candidates can usually retake tests that they fail or do not complete.

On average, GED recipients perform about as well as graduating high school seniors on each of the five tests. Their scores are a little higher on the social studies, science, and literature tests and a little lower on the writing skills and math tests. However, the relation between the performance of GED recipients and that of high school seniors on the entire five-test battery has been a subject of debate.

From the early years of the GED, critics charged that passing the tests was too easy and did not reflect the skills of high school graduates. Beginning in the 1980s, new challenges to the test arose in several areas. First, a series of studies by military manpower researchers showed that enlistees with GEDs tended to have high attrition rates. Second, the Wisconsin Department of Public Instruction found that GED recipients enrolled in Wisconsin colleges were much more likely than high school graduates to leave and that their grades and other measures of performance were lower than those of high school graduates. Third, a 1993 study by economists Stephen Cameron and James Heckman concluded that GED certificate holders are less likely to be employed, earn less, and experience more job turnover than high school graduates, once other factors are controlled. Against this background, the current synthesis will examine research on the performance of GED recipients in postsecondary education, the labor market, and the armed services.

Functions of the GED

Before assessing the performance of GED recipients, however, the synthesis examines the social functions that the GED process performs or is said to perform.

The GED as a Stimulus to Human Capital Investment

Human capital investment is the time, money, and other resources expended in acquiring work-relevant skills. Time spent in formal education and/or training is a widely used measure of human capital investment. Based on this measure, to what extent does the GED stimulate human capital investment among non-high school graduates?

The GED as an Incentive to Invest

In 1980, GED examinees spent a median of 20 hours (and $10) preparing for the tests. By 1989, they were spending a median of 30 hours in preparation. This change was driven by a doubling in the proportion of candidates who spent over 100 hours preparing for the tests—from 11.8 percent to 24.2 percent. Reasons for this increase are unclear.

Although 30 hours of test preparation is a very limited investment in human capital, the proportion of examinees who spent more than 100 hours preparing for the GED deserves attention. Research suggests that an adult learner needs approximately 100 hours of instruction to achieve a 1-year gain in reading ability.

Still, such investments are much smaller than the approximately 410 hours spent in core curriculum classes in a typical school year. In 1995, GED test takers had completed a mean 9.9 years of school. With 2.1 years of additional schooling, high school graduates typically had 861 more hours of core curriculum classes.

The GED as a Disincentive to Invest?

Because passing the GED takes less time and effort than a high school diploma and may appear to have the same status, some researchers believe that it encourages marginal students to drop out of school or facilitates their departure. Almost half of the states (24) allow young people to take the test before the age at which they would ordinarily graduate from high school, and several have allowed school systems to start alternative in-school programs leading to a GED. (The ACE commission waived a prohibition against administering the GED to students in high school on a trial basis and subject to conditions.)

No systematic research directly addresses the question of whether the GED encourages dropping out, and an examination of related literature found no substantial evidence to support the hypothesis that it does.

Measuring and Assessing Cognitive Skills

The GED was designed to measure the ability to understand, evaluate, and manipulate concepts and information and to use knowledge and reason to reach general conclusions in five subject areas. Underlying performance in each of these areas is a set of basic cognitive skills that is the primary determinant of the scores on all five. The underlying cognitive skills are reflected in intercorrelations among the tests ranging from .64 to .82 and in strong correlations between total GED Test scores and total scores on other tests, such as the American College Test (.80), the National Adult Literacy Survey (.78), and the military entrance examination (.75 and .79 in two analyses).

Analyses of data from the National Adult Literacy Survey (NALS) and the Armed Services Vocational Aptitude Battery (ASVAB) show that GED certification designates non-high school graduates whose cognitive skills exceed those of other dropouts. On average, GED recipients have adult literacy skills equal to

those of high school graduates. In terms of ASVAB scores, GEDs are not equal to graduates, but they are closer to graduates than to dropouts.

The GED as a Sorting Procedure

The GED process, beginning with the decision to take the test and ending with the certification of successful examinees, provides an opportunity for high school dropouts to demonstrate their cognitive skills and related knowledge. GED examinees tend to have more of these skills than other dropouts, and simply by taking the test, they set themselves apart. Self-selection is the major part of the sorting process that the GED performs. Although many of today's new dropouts take the test, only 1.5 percent of 44 million adults without high school diplomas have done so. Once an individual takes the test, the probabilities of passing are fairly high.

The GED process tends to select dropouts who have more schooling and higher socioeconomic status than other dropouts, as well as stronger cognitive skills. They have fewer of these assets than high school graduates, however.

The GED as Certification

The GED process certifies dropouts with relatively good cognitive skills as having passed the tests, providing a high school equivalency award. This certification can serve to signal educational institutions, employers, and others that the GED recipient has demonstrated the ability to read, write, think, and compute at the high school level, according to state standards for passing the test.

Postsecondary institutions usually accept the GED, but many require additional evidence of ability to perform in college, such as SAT or ACT scores. In this respect, the admission requirements for GEDs are similar to those for high school graduates. In addition to opening doors to postsecondary education, GED certification can also help GED enrollees obtain federal financial aid, such as Pell Grants and Guaranteed Student Loans.

Most employers surveyed in the studies reviewed accepted the GED credential and regarded it as equivalent to a high school diploma. Further, a majority of those responding to two surveys thought that GED recipients performed their work as well as high school graduates. However, many of the employer studies raise questions about the relevance of all secondary education credentials to hiring decisions. If the saliency of secondary education credentials for employer decisions is low, then the distinction between those with credentials and those without may not matter much, and the signal that an employer receives from either kind of credential may be weak.

The GED as a Self-Confidence Builder

Low self-esteem is associated with an array of negative outcomes. Breaking out of the cycle of low self-esteem and poor performance can be extremely difficult. Survey research indicates that most high school dropouts who pass the GED feel better about themselves, and their increased self-esteem may help them acquire more education, get better jobs, and generally improve their life circumstances. The durability of this new self-confidence is an important question, but one for which there is no answer at present.

Postsecondary Outcomes

What proportion of GED recipients enroll in postsecondary education and training programs, and how well do they do in them?

Postsecondary Enrollments

GEDs are much more likely to participate in postsecondary education and vocational training than are other dropouts. In the survey studies reviewed, over half of the GED recipients—between 50 and 63 percent—got some additional civilian education and training in degree-granting colleges, vocational schools, apprenticeship programs, or on-the-job training. GEDs are most likely to enroll in community colleges and vocational/technical schools and to concentrate on acquiring occupational skills. This focus is understandable: most are adults and many have family responsibilities.

The GED share of postsecondary enrollments declined from 7 percent in 1986 to 4 percent in 1992. Reasons for the decline are unclear, but it occurred in less-than-2-year, 2-year, and 4-year institutions.

Postsecondary Grade Point Averages

The grades of GED students in the institutions examined were close to those of high school graduates. For example, among beginners in 4-year colleges, the difference was roughly that between a C and a low C+. The grades of GEDs and high school graduates enrolled in postsecondary education programs tended to converge over time, as selective attrition of the less able students equalized the groups. In vocational programs, which often last 1 year, this convergence effect was slight; the grade-point averages of GEDs were approximately equal to those of high school graduates. In 2-year colleges, the ratio of GED to high school diploma grade point averages increased from .82 in the first year to 1.06 upon completion, and in 4-year colleges, it increased from .86 to 1.00. In all three types of schools, GEDs who graduated earned approximately the same grade point averages as those with regular high school credentials.

Postsecondary Persistence and Completion Rates

In general, GED recipients are less likely than high school diploma holders to complete their postsecondary education. While GEDs graduate from vocational programs at about the same rate as their counterparts, they are only half as likely to earn associate's degrees and much less likely to earn bachelor's degrees.

These attrition rates are probably not a "result" of GED certification, but of other predisposing factors associated with possession of the credential, such as single-parent status and delayed enrollment.

Labor Market Performance of GED Recipients

Over the last two decades, the real annual earnings of young adults have declined at rates related to educational attainment. College graduates lost ground in the early 1970s, but their earnings have leveled off since then. The earnings of workers with less education have continued to decline. Those with the least education and the lowest earnings, the high school dropouts, are losing ground most quickly. Dropouts would gain substantially if they had the earnings of high school graduates, but assuming the continuation of present conditions, they would still be experiencing a long-run decline in earnings.

To assess the labor-market performance of GED recipients, we reviewed cross-sectional studies, which compared GED recipients and others at the same time, and longitudinal studies, which compared the performance of GEDs and others before and after completion of the test battery.

Cross-sectional Studies

The analyses of cross-sectional studies examine the labor-market performance of GED recipients; highlight three key explanatory variables; and assess the indirect effects of GED attainment.

Labor Force Participation and Employment Status

In controlled comparisons, the GED credential had little effect on labor force participation or unemployment but was positively associated with gains in full-time employment.

Wages

In controlled analyses, the wages of male GEDs were 6 to 12 percent higher than those of dropouts; female wages were up to 13 percent higher; and the wages of GED adults (both sexes) were 5 to 11 percent higher. In all studies but one, however, GEDs earned less than high school graduates. Much of the apparent wage effect of GED status may actually be an effect of other key characteristics of GED recipients, which are examined below.

Time Spent Working

In controlled comparisons, GED males spent less mean time working than dropouts, while females spent more time working. On average, GEDs of both sexes worked less than high school graduates. In simple comparisons, GED males experienced more job turnover than dropouts, while females experienced less. Both male and female GEDs had more job turnover than high school graduates.

Annual Earnings

In simple and controlled analyses, GEDs earned more than other dropouts but less than high school graduates. In the short term, GED recipients had no earnings advantage over dropouts, but their relative earnings grew over time. The low returns to the GED shortly after certification may reflect opportunity costs of acquiring more education and training.

Key Control Variables and GED Outcomes

Several variables associated with GED status may explain much of the apparent GED effect on wages.

Years of Schooling

On average, GED recipients have more years of elementary and secondary schooling than other dropouts and (of course) less than high school graduates. These differences may affect wages. In the research reviewed, among males of similar race, ethnicity, and maternal education, all differences in hourly earnings between the three groups could be explained by differences in years of secondary schooling completed. Neither the high school diploma nor the GED had any additional "sheepskin" effect. Among females, a substantial part of the wage differences could be explained by years of secondary schooling, but the there remained a possibility of credential effects.

Postsecondary Attainment

High school graduates have more postsecondary education than GED recipients, who in turn have more than other dropouts. Controlled studies showed that variation in postsecondary attainment helps explain the wage difference between GED recipients and diploma graduates and, to a much lesser extent, the difference between GED recipients and other dropouts. Nevertheless, GEDs still had higher wages than other dropouts after the effect of postsecondary education was taken into account.

Cognitive Ability

On average, the basic cognitive ability of GED recipients is close to that of high school graduates and considerably above that of dropouts. Controlling on cognitive ability greatly reduced or eliminated any wage differences between GEDs and dropouts but had a smaller effect on differences between GEDs and high school graduates. Controlling on ability statistically removed the GEDs'

primary advantage over other dropouts—their greater cognitive skills. Since the basic cognitive skills of GEDs are close to those of high school graduates, the difference in their wages was less affected by the introduction of this variable as a control.

Educational attainment and cognitive ability are strongly related. Taken together, analyses of the effects of secondary schooling, higher education, and cognitive ability suggest that accumulated human capital, reflected in level of education and ability scores, accounts for most of the wage differences among high school graduates, GEDs, and dropouts of similar backgrounds.

Indirect Effects of GED Attainment

Although direct effects of GED certification on wages are limited, once education level or ability are controlled, the credential does have substantial indirect effects. It increases access to postsecondary education and training, and if GED recipients take advantage of that access, their wages tend to improve. Female GEDs also receive indirect wage benefits through the additional job tenure and work experience that the GED enables them to obtain. Male GED recipients, however, do not increase their wages through tenure and experience, because they have less than dropouts.

Longitudinal Analyses

An analysis of data from the National Longitudinal Survey of Youth (NLSY) found no initial GED effect on wages for males, but over time, wages grew more rapidly than they would have had GED certification not been attained. The authors think the data reflect an indirect GED effect on wages through further training and job search. In another study based on the NLSY, wage effects for females were positive but not statistically significant.

An analysis from an evaluation of a federal JOBS program found that having a GED was associated with $47.37 per month higher earnings for males and females combined. An analysis of women in a job training program for welfare mothers found a GED effect of $22.60 monthly, an 8–10 percent increase in earnings.

In the JOBS study, time spent in basic education to prepare for the GED was negatively associated with earnings, possibly because participating in basic education resulted in less time working. On the other hand, basic education, a GED, and time spent in job training or college had substantial positive effects. The combination of a GED with vocational training and attainment of an occupational license produced especially large effects.

Based on the evidence, high school dropouts can improve their economic condition by obtaining the basic or remedial education needed to pass the GED and through the GED, obtaining further job-related education and training. If such a strategy is followed, the opportunity costs of acquiring additional educa-

tion and training may limit early returns to the credential, but the returns will increase over time.

The GED and the U.S. Armed Forces

Until the 1980s, the armed services made no practical distinction between high school graduates and GED recipients in enlistment policy. Then military manpower studies showed that GED attrition rates were double those of high school graduates and about the same as those of dropouts. For example, between 1977 and 1983, the 36-month attrition rates were 22 percent for high school graduates, 45 percent for GEDs, and 52 percent for dropouts. The services invest heavily in training and providing for new recruits, and high attrition rates are unacceptable. Consequently, the military developed a three-tier system for assessing the educational qualifications of applicants. High school graduates are placed in the first tier and are regarded as the best prospective recruits. GEDs are placed in the second tier, and dropouts in the third. Nevertheless, some 35,000–40,000 GED recipients do enlist in the military each year.

Conclusion

The GED process identifies and certifies high school dropouts whose ability to read, write, think, and do math is better than that of other dropouts and about equal to that of high school graduates, on average.

The tests do not measure other characteristics related to performance in postsecondary education, the civilian labor market, and the military. GED recipients typically have more schooling and come from families with higher socioeconomic status than do other dropouts. High school graduates, in turn, have more of these assets than GEDs. Characteristics such as these explain a substantial part of the differences in the performance of GEDs, dropouts, and high school graduates.

GED certification provides reliable information about an individual's basic cognitive skills to postsecondary institutions, employers, the military, the federal government, and others who might be asked to make a selection decision about that person.

By signalling cognitive competencies to decision makers who usually know little about an individual, the GED can help open the door to opportunity. Once through the door, however, the individual has to use the cognitive skills and whatever other knowledge, skills, and abilities he or she may have in order to succeed.

GED certification can help in gaining access to postsecondary education and can help recipients get financial assistance. Once enrolled in college, GEDs earn grade point averages similar to those of high school diploma holders, but they are less likely to graduate.

In postsecondary vocational programs, GED recipients seem to be average students. The short-term, job-related nature of these programs and the hands-on learning they entail probably have an appeal for students who left high school early, are struggling to fulfill adult responsibilities, and want to improve their job prospects.

GED certification can also increase job opportunities somewhat. Once on the job, GED recipients have to use both their cognitive and noncognitive skills in order to succeed, as do other workers.

Male GEDs tend to earn higher wages than other dropouts, but because of their greater schooling, they might have earned as much without the credential. They spend about the same amount of time working as other dropouts, and they have more job turnover. Female GEDs get at least the same relative wage advantage as males—an advantage not entirely explained by prior schooling—and, unlike males, they spend more time working and have less turnover than dropouts do. Most of the GED's effect on wages comes not from the credential, but from the human capital that it reflects or makes accessible.

It is worthwhile for a high school dropout to get a GED. Its biggest advantage is that it increases access to postsecondary education and training, which tend to improve economic outcomes.

On the other hand, GED rates of persistence in the structured activities examined in this study seem problematic, especially for males. First evident in high school, the problem appears to recur in other contexts. GED attrition rates in the military were close to those of dropouts. In postsecondary education, other than vocational programs, GED graduation rates were much lower than those of high school diploma holders. In the labor market, male GEDs spent less time working than dropouts, or the same amount, and had more job turnover. (The labor market outcomes are suggestive but difficult to interpret. To some extent, they may reflect the opportunity costs of acquiring more education and a tendency to leave old jobs for new ones with better pay.)

The GED process certifies one form of human capital—cognitive skills—but, unlike a high school education, does not generate it. Nor does the GED process generate or certify noncognitive human capital, such as work habits and the ability to function well in organizations—attributes positively related to persistence. Based on military studies, researchers have concluded that completion of high school demonstrates the presence of such attributes and that a high school diploma reflects them.

Noncognitive skills, abilities, and attitudes come from many sources, especially the family and the school. The role of the school in developing them is widely recognized but not well enough understood. Involvement in the process of schooling (e.g., regular attendance, meeting deadlines, complying with authority, and cooperating with others) may affect later outcomes as much as learning the content of schooling.

Years of education and training, either preceding or following GED attainment, have much more impact on labor market outcomes than the credential itself. Hence, marginal students should be (and usually are) encouraged to finish high school wherever possible. For those who do drop out, participation in alternative programs that have structure, rigor, and longevity may recoup some of the advantages lost by not finishing high school. Education policy makers should consider developing high school completion programs leading to a regular or adult diploma. Along other lines, awarding higher levels of GED certification for higher test scores, which educators in South Dakota are considering, may provide an incentive for dropouts to invest more time and energy in studying for the test. Those who pass the test should understand that GED certification is primarily a stepping stone and that additional progress in the labor market can best be made by completing postsecondary education and training programs. Counseling to help GED recipients navigate in college could also be a useful measure.

In some respects, GED recipients resemble high school graduates; in others, they resemble dropouts; in still other ways, they fall between the two. Given these mixed findings, the common practice of counting GEDs as high school graduates in educational statistics should be reconsidered.

Further, we should keep in mind that neither the high school diploma nor "some college" have been sufficient to enable young adults to maintain earnings over the years since the 1970s. It seems unlikely that, in the absence of other macroeconomic changes, education policy alone can reverse this trend.

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BACKGROUND

BACKGROUND

Introduction

The General Educational Development Tests are the most widely recognized form of alternative secondary certification in the United States. Currently, almost three quarters of a million high school dropouts, aged 16 and older, take the seven and one- half hour test battery each year. They do so, according to surveys, mainly to get more education and better jobs.

The purpose of the GED Tests, as currently formulated, is "to provide an opportunity for adults who have not graduated from high school to earn a high-school level educational diploma" by demonstrating "the attainment of developed abilities normally acquired through completion of a high school program of study....The credential provided by passing the GED may be used in a manner identical to a high school diploma" (GED Testing Service 1993a).

The GED Testing Service ordinarily refers to those who pass the exam as "graduates," and the credential they earn is called a "diploma" or sometimes, more explicitly, a "high school diploma."[1] Through much of its history, the GED has been described as a high school equivalency credential,[2] and it is formally regarded as such by most states and many federal programs. GED recipients are typically counted as high school graduates in statistics of state and local educational systems and in those of federal agencies such as the Bureau of the Census.

It is reasonable, then, to ask how well GED recipients perform, compared to high school graduates, in arenas such as postsecondary education, the labor market, and the military; and many researchers have done so. Further, because the GED Tests are intended to increase opportunity for those who have not completed high school, it is also important to ask how well GED recipients perform, compared to other dropouts. Where there are differences in either comparison, it will be useful to determine, where possible, how much of a given difference is due to the GED and how much to other factors, such as socioeconomic background and individual characteristics not measured by the tests.

This study synthesizes a half century of research that addresses these and related questions. It describes the development and characteristics of the tests and the challenges that have been raised to them; discusses the functions of the GED process; and examines the performance of GED recipients in postsecondary education, the civilian labor market, and the military.

Brief History

The GED Tests were developed in the early 1940s, when the United States was entering World War II. At the time, many service members did not have high school diplomas, either because they had left school to join the armed forces or

because they had left for other reasons and later joined the military. The Roosevelt administration favored federal support for the college education of returning veterans (Quinn 1997a). However, lacking high school diplomas, these service members would not have been able to enter college without some special arrangements. After World War I, high school diplomas had often been granted for wartime service. Postsecondary institutions also had granted college credit for service in the military. Over time, though, colleges and universities came to oppose this practice, and, as an alternative, the American Council on Education (ACE) proposed testing veterans to determine competence for college.

In 1942, members of an Advisory Committee to the Army Institute, including Ralph Tyler and Everett Lindquist, selected five tests from the Iowa Test of Educational Development to form the first General Educational Development Tests. Tyler and Lindquist were proponents of progressive education, which emphasized the integration of learning with everyday life and de-emphasized formal academic learning that apparently had little practical application (Quinn 1997a). The Iowa Test, and the new GED Tests, reflected this orientation. In part, the exams emphasized *reading and interpreting* passages in the social sciences, natural sciences, and literature. Lindquist explained that

> *there are many different kinds of situations in which a person has occasion to use his education, but that which lends itself most readily to testing is the reading situation—that in which he interprets, evaluates critically, and employs in his own thinking, ideas and information which are presented to him in print (quoted in Quinn 1997a, p. 31).*

The emphasis on using learning in everyday life was also evident in the math test, which, according to Lindquist, measured

> *the ability to deal with numbers, [including]... such things as estimating expenses on home repairs, handling simple business transactions, figuring out costs on your own insurance, taxes, investments, installment purchases, and so on (quoted in Quinn 1997a, p. 31).*

The GED Tests were first administered to veterans and service members in 1943.[3] Initially, colleges and universities were the primary users of the test results, employing them in the admissions process. After the war, the GED battery was also administered to civilians, and states began to grant high school credentials to those who passed. By 1959, civilian test takers outnumbered veterans and service members.[4]

Use of the GED has expanded tremendously since the tests were first introduced. In 1995, 503,813 GED credentials were issued in the United States, as were 2,553,000 regular high school diplomas. GEDs accounted for one-sixth of the combined total in that year. Not only has the number of GED credentials increased, the GED share of secondary credentials has grown as well. In 1968, 5 percent of high school credentials were equivalency certificates—mostly GEDs. By 1987, the proportion had risen to more than 14 percent (Cameron and

Heckman 1993), and in 1995 it had reached 16 percent. Among younger people, in 1989 GEDs made up 4.2 percent of secondary credentials held by those in the 18–24 age range; by 1995, the proportion had increased to 7.7 percent.[5]

Table 1 shows the number of test batteries administered in the U.S., its territories, and Canada from 1954 to 1973, and the number of people completing the tests from 1974 through 1995, together with the percentage who passed.[6]

The number of GED Tests administered rose from a few thousand in the early years to more than 100,000 in 1964 and to 440,000 in 1973. Marked increases in test administration beginning in the mid-1960s paralleled the expansion of federal education initiatives. Adult literacy programs, such as those established by the Adult Basic Education Act of 1966, encouraged and prepared participants to take the GED. Pell Grants and Supplementary Educational Opportunity Grants required recipients to be students at approved postsecondary education or training institutions and to demonstrate a need for financial aid and an ability to benefit from it. The U.S. Department of Education uses GED certification as one way to demonstrate ability to benefit. While a causal link between the expansion in federal education programs and accelerated growth in GED completions has not been established, such a link is plausible (Cameron and Heckman 1993). By 1980, almost three quarters of a million individuals were completing the tests. GED test taking slackened after that, but a recent rise brought the number completing the tests to 724,000 in 1995.

During and after World War II, the GED pass rates were very high. According to the Veterans Testing Service, for example, in the first years of the program, some 92 percent of veterans who took the GED passed it, and local data in 1945 and 1946 showed pass rates around 86 percent (Quinn 1997a). By the 1950s the rates were somewhat lower, but substantial majorities of examinees still passed the tests. Between 1974 and 1995 the median yearly pass rate was 71.5 percent.

The eventual pass rates for first-time test takers are not necessarily evident from table 1, because individuals may take the GED exam more than once. Though practices vary by state, examinees who fail to complete one or more of the five tests the first time usually need only retake those tests, not the entire battery. The rate of test retaking has increased. About 7 percent of tests administered in 1958 were retaken, as compared to about 13 percent of tests completed in 1995 (Veteran's Testing Service n.d., GED Testing Service 1996a).[7]

Two studies have examined the longer-term pass rates for cohorts of examinees. Cervero (1983) reported that 71 percent of examinees surveyed in spring 1980 passed the tests at the time they took it. Responses to his fall 1981 follow-up survey indicated that an additional 15 percent had passed the tests in the 18 months since the first survey. In all, 86 percent of the 1980 test takers in the sample had passed by 1982. Kroll and Qi (1995) noted that 66 percent of those who completed the tests in the United States and its territories in 1989 were awarded credentials.[8] In their 1992 follow-up survey, an additional 9 percent—75 percent in all—reported receiving credentials. While the eventual pass rate of

Table 1.—Number of GED Tests administered, number of people completing test, and percent passed by year

Year	Number of Batteries Administered	Percent Passed	Year	People Completing Battery	Percent Passed
			1974	430,253	68.9
1954	[42,141]	[80.0]	1975	541,914	70.2
1955	[44,840]	[79.0]	1976	539,729	67.8
1956	[52,552]	[77.0]	1977	517,847	69.7
1957	[52,874]	[76.0]	1978	495,728	N/A
1958	[58,723]	[78.0]	1979	608,229	68.4
1959	[56,496]	[76.0]	1980	741,601	70.8
1960	[61,093]	[77.0]	1981	732,229	72.1
1961	[68,080]	[74.0]	1982	724,971	73.9
1962	[75,428]	[75.0]	1983	711,946	73.1
1963	[88,242]	[71.0]	1984	641,697	73.0
1964	[116,875]	[73.0]	1985	647,496	72.4
1965	[143,974]	[72.0]	1986	674,430	72.6
1966	[185,778]	[71.7]	1987	690,509	74.1
1967	[218,386]	[70.0]	1988	651,247	72.3
1968	[265,499]	[69.4]	1989	589,002	68.4
1969	[293,451]	[71.7]	1990	662,789	69.9
1970	[331,534]	[70.8]	1991	706,182	71.5
1971	[387,733]	[68.7]	1992	688,582	71.4
1972	[430,346]	[67.4]	1993	685,304	71.4
1973	[440,216]	[68.2]	1994	712,421	73.0
			1995	723,899	72.0

NOTE: Bracketed numbers and percentages through 1973 are for test batteries administered. Beginning in 1974, the numbers and percentages are for individuals completing the battery. Not all individuals who take the test battery complete it. Aggregate records of test completers were not kept before 1974.

SOURCE: GED Testing Service, 1980, p. 16, 1996a, p. 30.

GED examinees is unknown, these studies suggest that it is higher than the rates reflected in the annual statistics.

GED Content

Since 1943, there have been three versions of the GED, each with tests in five subject areas. Though the subject areas have remained fairly constant, the content of the tests has changed from one version to the next and from year to year, reflecting changes in high school curricular requirements. Figure 1 shows the three versions and the subject tests in each.

As a rule, the tests present written passages and multiple choice questions (five choices per question). Sometimes they also provide additional information needed to answer the questions, such as mathematical formulas. The writing skills test focuses on such things as the mechanics of writing (grammar, punctuation, spelling), sentence structure, and logic of presentation. Since 1988, the test has also required examinees to write a short essay.[9] The social studies, science, and literature exams emphasize ability to read and understand materials in these fields, including text, tables, and graphics. The math test originally focused on arithmetic, but by 1988, its composition was 50 percent arithmetic, 30 percent algebra, and 20 percent geometry (GED Testing Service 1993a). Currently, a new battery of tests, called GED 2000, is being developed by the GED Testing Service.

In general, the tests emphasize the ability to read, write, think, and do math, though some subject matter knowledge is needed. For example, the 1993 practice test on social studies required basic knowledge of the functions of the federal legislative, executive, and judicial branches to answer some questions. In the science test, correctly answering one question required knowing that cold temperature precipitates water from moist air. In the math test, examinees had to know how to use the formulas that were provided.

GED Standards

Minimum scores for passing the GED were first constructed in 1942, based on advice from a group of testing experts and educators. The consensus of the group was that the "cut score" for passing should be the point at which about 20 percent of high school seniors could not pass.[10] This corresponded to a minimum standard score of 35 (out of 80) on each test or an average of 45 across the battery (a total of 225 out of 400). The 35 or 45 minimum score prevailed from 1943 until May, 1982, when ACE's Commission on Educational Credit and Credentials raised it to 40 or 45. In 1997, the Commission established a new minimum of 40 *and* 45.

Above the minimums, states have been free to set their own conditions for passing the GED and awarding credentials (GED Testing Service 1993a, Patience and Whitney 1982). Table 2 shows the numbers of states with different minimum score requirements in 1995 and the proportion of graduating high school seniors who met a given standard in a 1987 administration of the tests.

Figure 1.—Three versions of the GED test battery

1942–1978 (10 hours)	1979–1987 (6 hours, revised to 6 3/4 hours)	1988–present (7 1/2 hours)
1. Correctness and Effectiveness of Expression	The Writing Skills Test	Writing Skills
2. Interpretation of Reading Materials in the Social Studies	The Social Studies Test	Social Studies
3. Interpretation of Reading Materials in the Natural Sciences	The Science Test	Science
4. Interpretation of Literary Materials	The Reading Skills Test	Interpreting Literature and the Arts
5. General Mathematical	The Mathematics Test	Mathematics Ability

SOURCE: GED Testing Service 1993a, pp. 2–4.

The current minimum of 40 on each test and an average of 45 on all five, established in January 1997, is more selective than the previous 40 or 45. Some 75 percent of the 1987 seniors met the previous standard, but only 66 percent scored 40 and 45.

There has long been debate over the appropriate level at which to set standards for passing the test. Some educators and researchers believe that the cut scores are too low and that the credential does not reflect the level of skills needed for postsecondary education and the workplace (see Quinn 1997a). Others favor the current standards or less rigorous ones, regarding more difficult standards as barriers that block opportunity and discourage an already discouraged population of high school dropouts. Some of the issues in this debate parallel those in the debate over standards in the broader education community.

The GED tests have become harder to pass over the years. It is noteworthy that by 1995, 46 states had adopted standards that were more selective than the minimum of 40 or 45 required at the time. This represented a major, long-term change in the cut scores set by states. As of 1949, only 22 of the then 48 states had adopted scores above the ACE minimums of 35 or 45 (Dressl and Schmid 1951). Thus, over time, ACE raised the required minimum scores, and the states increasingly adopted passing scores above the ACE minimums. Whether this pattern will be repeated with the 1997 GED minimums has yet to be seen. Currently only two states have passing standards higher than the new minimum.

Table 2.—Number of states in 1995 with various GED minimum requirements and proportion of 1987 seniors meeting those requirements

GED Score Standard	Number of States	Percentage of 1987 High School Seniors Meeting Requirement
Minimum 40 or mean 45	4	75
Minimum 40 or mean 50	1	71
Minimum 35 and mean 45	26	70
Minimum 40 and mean 45	18	66
Minimum 40 and mean 46	1	64

SOURCE: GED Testing Service 1996a, p. 31.

One measure of the ease or difficulty of passing a multiple choice test is the number of correct answers above chance guessing that is needed to meet the minimum passing requirement. Table 3 presents this information for 1995 and for 1944, one of the first years of the GED.[11] The first column shows the number of questions on a given test; the second shows the number that would be correctly answered by chance (usually one out of five choices); the third shows the minimum number of correct answers required to pass the test; and the fourth shows the difference between the number of correct answers expected by chance and the number required to pass.

In 1944, the required passing score on each test was just slightly above chance, except in writing. In 1995, the required passing score was about twice the number expected by chance. By this measure, as well as others, the GED has become harder to pass over time.[12]

Norming and Scoring the GED

Because the GED is used to certify skills comparable to those of high school graduates, the scale for scoring test results is referenced to the performance of national samples of graduating high school seniors in norming studies.[13] These studies have been conducted in 1943, 1955, 1967, 1977, 1980, 1987, and most recently, 1996. The next full-scale norming will take place before the introduction of the new version of the GED scheduled for the year 2000.

In the norming process, national samples of seniors are administered one or more of the five GED tests. Statistics such as the mean, standard deviation, and range are computed from the raw scores (e.g., number of correct items) for a given test. These statistics are then used to develop standard scores for the test. The standard scores of seniors are scaled to have a mean of 50, a standard deviation of 10, and a range from 20 to 80 on each test.

Table 3.—Correct answers expected by chance and relation to required minimum scores on five GED Tests

Test	1995 #Qx	1995 Chance #Correct	1995 Req'd Min#	1995 # > Chance	1944 #Qx	1944 Chance #Correct*	1944 Req'd Min#*	1944 #> Chance
Writing*	55	11	—	—	100	—	—	15
Soc. Std.	64	12.8	23	10.2	73	—	—	1.4
Science	66	13.2	24	10.8	65	—	—	2
Liter.	45	9	16	7	85	—	—	3
Math	56	11.2	22	10.8	50	—	—	1

* Numbers are not available or cannot be calculated.

SOURCE: Quinn 1997a (for 1944 data), and GED Testing Service 1993a (for 1995 data).

To understand the scoring of the GED, it is useful to examine the distribution of scores from one of the tests in the 1987 norming. Table 4 shows how a sample of high school seniors performed on the GED Science Test. (Four other samples of seniors performed similarly on the four other tests.)

There were 60 items on the test; the "Raw Score" column shows the number correct out of 60. About half of the sample (48–51 percent) answered 40 or 41 questions correctly. The corresponding mean standard score is 50. From one standard deviation below the mean (40) to one standard deviation above (60) encompasses a little more than two thirds of the cases. The remaining cases are in the tails of the distribution—the 14 percent with standardized scores below 40 and the 16 percent with scores above 60.

The seniors did not have trouble answering many of the questions in 1987, but scaling compensates for the apparent ease of the test. A GED examinee would have to answer two-thirds of the questions correctly to get a standard score of 50, equal to the mean for high school seniors. By answering 58 of the 60, he or she would score 73 and outperform all but one percent of the seniors.

At the lower end of the distribution, a GED examinee scoring 40, the passing minimum since 1982, would outperform only 14 percent of the seniors who took the test. Of course, it is more difficult to get the minimum score on all five tests than on just one. The probabilities cannot be estimated from the scores on each test. However, a sample of seniors took all five tests in 1987, and that part of the norming process is discussed below.

The GED tests are designed to give examinees "the opportunity to demonstrate achievement comparable to that of high school graduates" (GED Testing Service 1993a). On average, GED recipients do perform as well as graduating high school seniors on each test. For example, Enger and Howerton (1988) found

Table 4.—Scores and percentiles of 1987 high school seniors on the GED science test

Raw Score	Standard Score Rank	Percentile	Raw Score	Standard Score Rank	Percentile
60	80	99	33	45	31
59	77	99	32	45	29
58	73	99	31	44	27
57	69	97	30	43	26
56	67	95	29	43	24
55	65	93	28	42	22
54	63	91	27	42	20
53	62	88	26	41	19
52	60	84	25	40	17
51	59	81	24	40	15
50	58	78	23	39	14
49	57	75	22	39	13
48	56	72	21	38	12
47	55	68	20	37	11
46	54	65	19	37	9
45	53	62	18	36	8
44	52	60	17	36	7
43	52	57	16	35	6
42	51	54	15	34	5
41	50	51	14	33	4
40	50	48	13	32	3
39	49	46	12	30	2
38	48	43	11	29	2
37	48	41	10	28	1
36	47	38	9	26	1
35	46	35	8	24	1
34	46	33	7	21	1
			1–6	20	1

SOURCE: GED Testing Service 1993a, p. 116.

that 1985–86 GED recipients who had been administered tryout forms for the 1987 norming (in addition to the regular GED test battery) answered approximately the same number and percent of questions correctly on each of the five tests as did the 1987 samples of seniors.[14] (The authors also reported that the samples of seniors were fairly representative, though private school students were over-represented.) Similarly, ACE found that 1989 GED recipients had approximately, but not exactly, the same mean scores and the same percent correct on each test as did the 1987 seniors (GED Testing Service 1993a; Baldwin 1992). GED recipients did slightly better than high school seniors on the tests that emphasize reading—social studies, science, and literature—and not quite as well on the math and writing skills tests.[15]

While the performance of GED recipients on each test is comparable to that of high school seniors, interpreting their performance on the full five-test battery is more complicated. The performance of GED examinees is referenced to that of a sample of high school seniors who took all five tests in 1987. Based on observations in Wisconsin, Quinn believes that the sample of seniors who took the seven and one-half hour test battery tended to lack motivation to do well on it (Quinn 1997a, 1997b). Low rates of participation in taking the battery also suggested to her that the national sample of senior test takers may not have been representative (see appendix A).

In general, one can have reasonable confidence in the 1987 senior score distributions on the individual tests. However, statistics from the administration of the five-test battery bear closer examination.

Challenges to the GED

Since the early years of the GED, questions have been raised about the ways in which and the extent to which the tests reflected skills equivalent to those necessary to attain a high school diploma. In general, its critics maintained that the GED was a low-level test battery measuring a narrow range of basic literacy skills, that its relation to high school education was tenuous at best, that the passing scores on each test were not much above chance guessing, and that based on the early 35 or 45 criterion, most 9th-grade students could pass the test. Quinn's (1997a) institutional history of the GED describes these and other criticisms of the exam.[16]

Beginning in the 1980s, new challenges to the GED arose in several areas. First, a series of studies by the U.S. military services showed that attrition rates of enlistees with GED certificates were similar to those of high school dropouts and about twice those of high school graduates. Consequently, the military stopped regarding GED certification as equivalent to a high school diploma for purposes of selection among applicants.

Second, starting in 1984, the Department of Public Instruction in Wisconsin conducted a thorough study of GED programs in the state. It found that GED recipients who enrolled in Wisconsin colleges and universities were much more likely than high school graduates to leave them, and that their grades and other

measures of performance were lower than those of high school graduates. As a result of this research, the state raised its minimum standard for passing to 40 and 50, raised the minimum age for taking the tests to 18 1/2, and required coursework (in addition to passing the tests) for a GED diploma, as distinct from a GED certificate. The minimum scores for passing the tests were subsequently lowered after a 1993 statewide norming study found that half the state's high school seniors could not pass the tests. Wisconsin's new standard is still the highest in the nation: its 40 and 46 requirement (see table 2) is one point higher than the new minimum set by ACE.

Third, a study of GED labor market outcomes by economists Stephen Cameron and James Heckman (1993) concluded that GED certificate holders are less likely to be employed, earn less, and experience more job turnover than high school graduates. The authors argued that GED graduates more closely resemble high school dropouts than high school graduates by these measures.

These research efforts have stimulated new debate over the value of the GED as a means of promoting opportunity for non-high school graduates in postsecondary education, the civilian labor market, and the military. We will examine the performance of GED recipients in these arenas, but before doing so, we must understand how the GED process works in a social context. The GED is said to perform a number of important functions. The next section describes these functions and assesses the evidence on the extent to which the process actually performs them.

FUNCTIONS OF THE GED

FUNCTIONS OF THE GED

The GED process begins with an individual's decision to take the test battery and ends with the award of high school equivalency credentials to those who pass it. The process performs, or may perform, five functions that will be examined here: stimulating investment in human capital, measuring and assessing the cognitive skills of non-high school graduates, sorting out the more skillful, certifying those selected, and improving the self-confidence of GED recipients.

The GED as a Stimulus to Human Capital Investment

The value of additional education to labor market outcomes such as employment and earnings has been well documented.[17] Human capital investments—the time, energy, money, and other resources expended in acquiring work-relevant skills—pay off in the labor market. Hence it is useful to assess the extent to which the GED stimulates investments in human capital among non-high school graduates.

The GED as an Incentive to Invest

The GED certifies accumulated human capital in the form of basic cognitive skills and knowledge, whether acquired from school, work experience, or other sources. The GED process also stimulates investment in human capital by prompting prospective examinees to study for the tests. The amount of investment required will depend in part on one's accumulated skills and knowledge relative to those needed to pass the tests. If a person has 11 years of education and received average grades in school, a short brush-up on skills will probably suffice. On the other hand, if one has large deficits resulting from such things as disabilities, low levels of education, or language barriers, greater investments of time and effort to will be needed to pass the tests.

Time spent in formal education and training is perhaps the most widely used measure of human capital investment. Based on this measure, to what extent does the GED stimulate human capital investment among non-high school graduates? Surveys conducted by the GED Testing Service in 1980 and 1989 asked examinees to estimate how much time they spent preparing for the test. Their responses are shown in table 5.

In 1980, GED examinees spent a median 20 hours (and $10) preparing for the test. By 1989, they were spending a median 30 hours in preparation. This change was driven by a large increase in the proportion of candidates who spent over 100 hours preparing for the test—from 11.8 percent to 24.2 percent.

We do not know what accounts for the increase at the top of the range. We considered the possibility that immigrants, who tend to persist in adult educa-

Table 5.—Hours spent studying for the GED Tests: 1980, 1989 (percent in each category)		
Hours	1980	1989
None	16.5	6.5
1–10	21.4	21.0
11–20	12.9	13.5
21–30	8.6	8.6
31–40	7.5	7.0
41–60	10.5	9.2
61–80	5.3	5.4
81–100	5.5	4.6
101+	11.8	24.2
Total	**100.0**	**100.0**

SOURCE: Tabulations provided by GED Testing Service. Also see Malizio and Whitney (1981).

tion programs,[18] comprise an increasing share of test takers. However, in 1993, immigrants made up only 7 percent of GED examinees. So small a proportion could not account for much of the observed increase in preparation time. Another possibility is that in 1989 the GED was perceived by prospective examinees as more difficult than in the past. The writing sample had been introduced as part of the battery in 1988, and the number of examinees dropped in 1988 and especially in 1989, perhaps out of hesitation at taking the revised GED. This hypothesis gains some support from a Wisconsin study (Martin 1992) which found that after the state increased its GED cut score to 40 and 50, reported preparation time for the tests increased and performance in postsecondary institutions improved.

Although a median 30 hours is a very modest amount of preparation time, the increase in the proportion of examinees who spent more than 100 hours preparing for the exam is noteworthy. According to some researchers, an adult learner needs approximately 100 hours of instruction to achieve a one-year gain in reading ability (Mickulecky and Lloyd 1993).

Nevertheless, these investments of time are still much smaller than the estimated 410 hours spent on a high school's core curriculum in a typical school year.[19] In 1995, GED test takers had completed a mean 9.9 years of school (GED Testing Service 1996a). With 2.1 additional years of schooling, high school graduates had 861 more hours of core curriculum than GED examinees, on average.[20]

In assessing the GED as a stimulus to human capital investment, note that the skill deficit that helps drive test preparation is the difference between one's existing skills and the skills needed to pass the test battery, not to excel on it. It seems plausible that if the links between GED scores and rewards were strengthened, prospective examinees would be motivated to work harder for higher scores.[21] At least one state, South Dakota, is considering designating several levels of GED attainment, based on the scores.

The GED as a Disincentive to Invest?

Because the GED takes so much less time and effort than a high school diploma and may appear to have the same status, some researchers believe that it serves as a disincentive to human capital investment, encouraging marginal students to drop out of school or facilitating their departure through a process of negotiation (Quinn 1997a, Fine 1991). Minimum GED Test taking ages in some states are consistent with this possibility. As of 1985, 5 states had set the minimum age at 16 and another 10 had a minimum age of 17. A decade later, 12 states permitted test taking at age 16, and another 12 percent permitted it at age 17 (GED Testing Service 1996a). Currently almost half of the states allow young people to take the test before the age at which they would ordinarily graduate from high school.

Further, ACE's Commission on Educational Credit and Credentials has permitted school systems in seven states to set up in-school dropout prevention programs leading to GED certification. The commission waived its policy of prohibiting the administration of GED tests to youth currently enrolled in high school. The waiver was granted on a trial basis and subject to conditions. The number of participating states has changed over time (at least one has withdrawn), but some programs are still active.

Critics believe that such arrangements appeal both to frustrated youngsters who dislike school and to frustrated teachers and administrators, who would rather focus their energies on more receptive students. In this view, alternative GED-oriented programs may help the educational system function more efficiently, but they work to the long-run detriment of the students who are channeled out of the regular high school curriculum.

We do not know whether the GED encourages high school students to drop out; there are no controlled studies on the subject. We examined the research on reasons for leaving school and found that alienation from school (expressed in different ways) was the reason most commonly given, both by dropouts in general and by GED examinees (Rumberger 1987, Ladner 1987, Baldwin 1991). Desire to work was also an important factor in males' decisions to leave and pregnancy and marriage were important in females' decisions. However, there was no information on whether the prospect of attaining an alternative credential was among the reasons for dropping out.

Table 6.—Credential status of 1992 noncompleters as of 1994

Status attained	Diploma	GED	In alternative program	Dropout	Other
By 1992	—	14.3	—	—	0.4
In next 2 years	16.1	12.8	23.0	31.1	2.1
Total	**16.1**	**27.1**	**23.0**	**31.1**	**2.5**

—Not applicable.

SOURCE: U.S. Department of Education (1996d). Recalculated from table 17.

We also examined data on the probabilities of attaining a GED within a year or two of leaving school. If the chances were relatively high—say greater than 50/50—the prospects of getting a GED in the near future might encourage marginal students to leave. Data from the National Educational Longitudinal Survey (NELS) indicate that 18.7 percent of 8th-graders in 1988 had not graduated with their class by August, 1992 (U.S. Department of Education 1996d). Table 6 shows the credential status of these noncompleters almost two years later, in the spring of 1994.

An estimated 14.3 percent of those who did not graduate with their class had earned a GED by graduation time in 1992, and 12.8 percent earned the credential over the next two years. By this estimate, a student who dropped out of high school had more than one chance in four (.271) of getting a GED within several years. The prospects of earning a GED in the near term are not great, but they are not trivial, either. These data, while interesting, do not provide much help in answering the question.

We also examined the age distribution of GED test takers over time. If there were a marked increase in the proportion of young examinees during the period when states were reducing the minimum test-taking ages, it might indicate that marginal students were responding to increased opportunities to take the test. Between 1985 and 1996 there was an irregular increase in the proportion of dropouts aged 19 and younger who took the GED, from 33 percent to 39.5 percent (U.S. Department of Education 1996c, GED Testing Service 1997). However, the increase is part of a pattern of fluctuations over a longer period. Since 1974 the proportion of examinees age 19 and younger has risen and fallen within a range of 31 percent to 40 percent. Once again the data provide no clear answers. In sum, the research literature does not tell us whether the GED encourages dropping out of school.

Measuring and Assessing Cognitive Skills

The GED was designed to measure the ability to understand, evaluate, and manipulate concepts and information and to use knowledge and reason to reach conclusions in five subject areas. Underlying performance in each of these areas is a set of basic cognitive skills that is the primary determinant of the scores on all five. The underlying cognitive skills are reflected in intercorrelations among the tests ranging from .64 to .82 (GED Testing Service 1993a).

A traditional measure of cognitive skills is the common variance among aptitude test scores, reflecting the thinking ability that allows individuals who score well on one test also to score well on others. This ability is the result of both nature and nurture and is positively related to schooling. Baldwin et al. (1995) found a correlation of .78 between a general GED factor and a general National Adult Literacy Survey (NALS) factor. In two analyses, Means and Laurence (1984) found correlations of .75 and .79 between mean GED subtest scores and the military's Armed Forces Qualification Test (AFQT) scores.[22] Correlations between total GED scores and totals on other tests are also strong, as illustrated in appendix tables B–1 and B–2. In local administrations, the GED has shown correlations of .88 with its progenitor, the Iowa Test of Educational Development; .80 with the American College Test (ACT); .81 with the Adult Performance Level (APL) Survey; .77 with New York's Degrees of Reading Power (DRP) Test; .66–.68 with the Test of Adult Basic Education (TABE); and .61–.67 on the General Aptitude Test Battery (GATB). Correlations such as these provide evidence that the GED and the other tests are measuring a common core of cognitive skills.

Another way of determining the GED tests' ability to measure and assess cognitive skills is to compare the performance of GED recipients with that of high school graduates and dropouts on other tests. Several studies have made it possible to do so, relying on the National Adult Literacy Survey (NALS) and the Armed Services Vocational Aptitude Battery (ASVAB).

National Adult Literacy Survey

The National Adult Literacy Survey (NALS), sponsored by the National Center for Education Statistics (NCES) and conducted by the Educational Testing Service, was administered in 1992 to a representative sample of approximately 13,600 individuals aged 16 and older. The survey was designed to measure three types of literacy—prose, document, and quantitative—based on understanding of such everyday materials as news stories, maps, bus schedules, checkbooks, menus, and the like. Identification of GED recipients among the NALS test takers in the survey made it possible to compare their performance with that of high school graduates and dropouts (Kirsch et al. 1993). In a second study conducted jointly by the GED Testing Service and the Educational Testing Service, a national sample of GED examinees was administered the NALS, once again permitting comparison of GED recipients and high school graduates (Baldwin et al. 1995).

Table 7.—Average literacy proficiencies of GED recipients, high school graduates, dropouts, and adults age 16 and older[23]

	Prose	Document	Quantitative
No Further Education			
GED Recipients	268	264	268
High School Graduates	270	264	270
Dropouts	208	203	202
All			
GED Recipients	290	289	284
High School Graduates	294	288	294
Adults	272	267	271

SOURCE: Baldwin et al. (1995), pp. 8, 20. Kirsch et al. (1993), pp. 17, 119–121.

Table 7 shows the mean NALS test scores of GED recipients and high school graduates, both without further education, and of dropouts. It also shows the scores of all GEDs and all high school graduates, including those with further education, and the scores of the adult population in general.

Kirsch et al. (1993) demonstrated that GED recipients without further education scored as well on the NALS as high school graduates without further education. Our own calculations based on Kirsch's data show that dropouts have much lower NALS scores than either GEDs or high school graduates with no additional education. Passing the GED sharply distinguishes these recipients from other dropouts in terms of literacy.

Larin (1994) observed that this comparison between high school graduates and GEDs without further education does not show that GEDs have literacy proficiencies similar to those of high school graduates in general. Because most graduates have at least some college, while most GEDs do not, the comparison shows that most GED recipients score as well as the minority of less skilled high school graduates who do not go on to college.

However, table 7 shows that if we remove the restrictions on level of education, the scores of GED recipients are still similar to those of high school graduates, except in quantitative proficiency, and well above those of adults in the general population.

NALS scores, ranging from 0 to 500 on each test, are classified in five proficiency levels: Level 1 (0–225); Level 2 (226–275); Level 3 (276–325); Level 4 (326–375); and Level 5 (376–500). On average, all GED recipients and all high school graduates score a little below the mid-point of NALS' Level 3 proficiency (300). Adults in general score at the high end of Level 2. Typical NALS tasks

Table 8.—Percent of GEDs and adults scoring at NALS level 3 and above, by highest level of education

NALS Test	GED	HSG	Some college	AA	BA	BA+
Prose	67	48	70	77	85	91
Document	65	43	64	71	81	87
Quantitative	57	50	69	77	85	89

SOURCE: Baldwin et al. 1995, figure 1.3, p. 19.

that the average GED and high school graduate could perform include writing a brief letter explaining an error made on a credit card bill and using a calculator to figure the difference between the regular and sale price in an advertisement (Kirsch et al. 1993).

According to the National Education Goals Panel (1993), scores at Level 3 *and above* represent "the range of complex literacy tasks that the ... panel considers important for competing successfully in a global economy and exercising fully the rights and responsibilities of citizenship." Table 8 shows the percentage of GED recipients in the 1993 GED/NALS administration and the percentages of other adults at various education levels who scored at Level 3 or above on the NALS.

Two thirds of the GEDs in Baldwin's 1993 administration of the NALS (including those who would later go on to college) scored at Level 3 or above on the prose and document tests, about the same proportion as other NALS test takers with some college, and more than those with high school diplomas only.[24] On the quantitative test, 57 percent of GEDs scored at Level 3 or above, still more than high school graduates, but less than the proportion of those with some college.[25] Most GEDs, then, met the goals panel's standard for the skills essential to economic competitiveness and the exercise of civic responsibilities.

In a multiple regression analysis of state-level NALS data (Reder 1994) found that GED recipients had higher literacy scores than other dropouts on the Oregon Literacy Survey, but lower scores than high school graduates. Reder's high school graduates included those who had some postsecondary education but no degree. The reasons for the difference between Reder's findings and those above are not clear, but the difference may be due to the fact that his was a state, rather than a national, survey or to the multivariate nature of his analysis.

In any case, the national NALS data indicate that the GED clearly discriminates between the literacy abilities of recipients and those of other dropouts, that GED recipients perform as well as high school graduates, and that they perform better than adults in general.

Table 9.—Mean AFQT test scores of GEDs, high school graduates, and high school dropouts in the National Longitudinal Study of Youth (NLSY)

	Cameron & Heckman (1993) Males	Cameron (1994) Females
High school graduates	75.8	66.5
GEDs	64.7	56.3
Dropouts	45.5	38.6

SOURCE: Studies in this table.

Armed Services Vocational Aptitude Battery

The Armed Services Vocational Aptitude Battery (ASVAB) is used by the military to screen applicants for entry to the armed services and to assign new recruits to occupational training. It consists of 10 subtests, 4 of which measure verbal and quantitative skills, and 6 of which measure aptitude for various occupational fields. The four math and verbal subtests (arithmetic reasoning, mathematics knowledge, word knowledge, and paragraph comprehension) comprise the Armed Forces Qualification Test (AFQT), which is used in selecting enlistees. The other six tests, designed to measure such things as electronic and mechanical comprehension, help military personnel specialists place new recruits in appropriate occupational training.

Participants in the National Longitudinal Survey of Youth (NLSY) were administered the three-hour ASVAB in 1980. Earlier they had provided detailed survey information about themselves, including their level of educational attainment. Thus it is possible to compare the ASVAB scores of GED recipients with those of high school graduates and dropouts. First interviewed in 1979 at ages 14–21, the survey participants were reinterviewed in subsequent years through the time of this writing.

Four research studies—Cameron and Heckman (1993), Cameron (1994), Garet, Jing, and Kutner (1996), and Maloney (1993)—have compared the ASVAB scores of GED recipients, high school graduates, and high school dropouts, using data from the NLSY. Cameron and Heckman studied samples of male participants using 1979–87 NLSY data, and Cameron focused on females using 1979–89 data. Garet, Jing, and Kutner analyzed data for both males and females for the period 1979–92. Maloney's study focused on women ages 23–31. Although these follow-up periods differ, the studies all examined survey participants who were aged 15–22 when they took the ASVAB in 1980.

Among males, Cameron and Heckman found that high school graduates with no further education performed better on the AFQT than did GED holders, who in turn had higher scores than high school dropouts (table 9). The scores of GED recipients were closer to those of high school graduates than to those of dropouts. Cameron's findings for females were similar, although their mean scores were lower than those of males.

Garet, Jing, and Kutner created four factors from ASVAB test scores—math reasoning, verbal ability, processing speed, and mechanical knowledge. Their analyses showed that both male and female high school graduates scored better on all four factors than did GED graduates (see appendix table B–3). The GED recipients, in turn, scored better than high school dropouts on all the factors. Once again, the scores of GED recipients were closer to those of high school graduates than to those of dropouts. The authors also found that high school graduates who entered college directly had the highest scores, followed by those who delayed entry to postsecondary education, followed by GED graduates. The differences between GED recipients and high school graduates were greatest in the area of mathematical reasoning (Garet et al. 1996).

Maloney combined ASVAB subtests that tapped reading, math, and science aptitudes into a single measure of ability and then compared the composite scores of female GEDs, high school graduates, and dropouts. His results were similar to those in the other studies. GED women were just .03 standard deviation units above the mean for the entire sample. Female high school graduates were .27 SDUs above the mean, and dropouts were .69 SDUs below it.[26]

In comparing the scores of GED recipients and high school graduates without further education, it is not clear why GEDs had better relative performance on the NALS than on the ASVAB. Garet et al. speculated that the difference occurred because the ASVAB contains more items that tap knowledge of traditional high school curricula, such as algebra, geometry, and trigonometry. A related possibility is that the ASVAB includes more questions that tap higher-order thinking skills. Further research would be necessary to test these hypotheses.

Judging from performance on these two tests, it is evident that the GED process sorts out non-high school graduates whose cognitive skills exceed those of dropouts in general. GEDs are at least equal to high school graduates in terms of literacy, as measured on the NALS. As measured on the ASVAB, their cognitive skills are not equal to those of graduates, but they are closer to the skills of graduates than to those of dropouts. On the AFQT and ASVAB, the performance of GED recipients in math is not as strong as their performance in other areas. It may be that it is difficult to learn specific math skills outside a formal educational program.

The GED as a Sorting Procedure

The GED process provides an opportunity for high school dropouts to demonstrate their cognitive skills and related functional knowledge. Those who take the test tend to have stronger cognitive skills than dropouts in general. For example, in the GED-NALS study (Balwin et al. 1995), GED *examinees* scored 269–278 on the three NALS tests, while table 7 in the current study shows that dropouts scored 202–208 on the three tests. Simply by taking the test, GED examinees set themselves apart from other dropouts. Using data from table 1 and from Kolstad and Kaufman (1989), we estimate that between 1980 and 1986, 42.1 percent of young high school dropouts took the test battery, a substantial proportion.[27] Using a larger population base, Baldwin estimates that only 1.5 percent of 44 million adults without high school diplomas have taken the GED.[28] In either case, self-selection through deciding to take the test is the major part of the sorting process. Once an individual takes the GED, the probabilities of passing are fairly high, usually in excess of .7.

Interpreting Selection Outcomes

Data from several studies help to characterize those who prepare for the GED and those who pass it. One way of preparing for the test battery is to enroll in an adult literacy program. According to a review of the literature by Moore and Stavrianos (1995), those who participate and persist in adult literacy programs have more education, are more likely to be employed, and are younger than their nonparticipating counterparts. Rolfe and Wilson (1979) found that among participants in a GED preparation program, those who completed it described themselves in more positive terms than those who did not.

What do we know about the characteristics of those who pass the GED? Typically, the GED recipients in the national longitudinal studies earned their credentials at around age 19–20 (Murnane et al. 1995, 1997; Cameron 1994). They had left school in the tenth or eleventh grade, having acquired more schooling than other dropouts (Murnane et al. 1995, 1997; Maloney, 1991). Their parents had more education than the parents of dropouts but less than those of high school graduates (Murnane et al. 1995, 1997; Cameron 1994; Cameron and Heckman 1993; Garet et al. 1996). Their families' income followed the same pattern (Cameron 1994; Cameron and Heckman 1993; Garet et al. 1996; Kolstad and Kaufman 1989). The GEDs came from smaller families than did dropouts, but larger families than high school graduates (Cameron 1994, Garet et al. 1996). Female GEDs were less likely than graduates to come from two-parent families and equally likely or more likely than dropouts to come from such families (Cameron 1994, Maloney 1991). GEDs were more heavily minority (black or Hispanic) than graduates, but less so than other dropouts (Kolstad and Kaufman 1989; Cameron and Heckman 1993; Cameron 1994; Garet et al. 1996). However, two studies found that blacks were not disproportionately represented among GEDs (Maloney 1991, Murnane et al. 1997).

Evidently the process of preparing for and passing the GED tends to select high school dropouts who have more personal and social resources than other dropouts as well as stronger cognitive skills. They have fewer of these assets than high school graduates, however.

The GED as Certification

Having functioned to select dropouts with relatively good cognitive skills, the GED process certifies these individuals as having passed the tests and typically provides a high school equivalency award. This certification can serve to signal educational institutions, employers, and others that the GED recipient has demonstrated thinking skills and skills in reading, writing, and math at the high school level, according to state standards.

The educational and employment outcomes of the GED depend substantially on the extent to which educational institutions and employers accept GED certification as meeting a criterion for admission or hiring and on how they regard the credential.

Postsecondary Acceptance of the GED

Postsecondary institutions usually accept the GED, but many require additional evidence of ability to perform in college. In this respect, admission requirements for GEDs are similar to those for high school graduates, who often have to provide evidence, beyond a diploma, of their ability to perform well at the postsecondary level. ACE's Commission on Educational Credit and Credentials recommends that if a college or university has additional requirements beyond a high school diploma, they should apply to GED recipients as well as to high school graduates.[29]

In 1979, ACE surveyed 3,300 2-year and 4-year institutions, receiving responses from 2,236 (Spille memorandum 1982, reported in Quinn 1986). Almost all the responding institutions (95 percent) admitted non-high school graduates, including GEDs and those with other alternative forms of certification. Some 90 percent admitted GED recipients.[30] Of those accepting GEDs, 51 percent required additional information, such as scores from the Scholastic Aptitude Test (SAT), the American College Testing Program (ACT), or the College-Level Examination Program (CLEP), demonstrating competency to undertake college coursework, and 15 percent required GED scores above the state minimum. We surmise that the 4-year colleges in the sample were more likely to require additional information, and the 2-year colleges were less likely to do so.

ACE surveyed postsecondary institutions again in 1986, receiving 391 responses from its sample of 487 institutions (Hexter and Anderson 1986). The findings were similar to those of the earlier survey. The great majority of institutions (92 percent) had policies permitting students to matriculate without a traditional high school diploma but requiring alternative certification. Of those, 91 percent (84 percent of the total) accepted the GED credential. In addition, many

colleges and universities required scores from other tests, such as the SAT, the ACT, and the CLEP. The proportion of institutions requiring GED scores, as well as passing status, was higher than in the previous survey. Just under half of those accepting the GED credential also had minimum GED score requirements. There may also have been other requirements not covered by the survey.[31]

A survey of postsecondary institutions in Wisconsin found that all 4-year colleges in the state, except one, accepted GED certification (Pawasarat and Quinn 1986). Consistent with the national pattern, some colleges required GED scores above the minimum 225, and some also required minimum SAT or ACT scores. Two public colleges required GED holders to enter on probationary status. Admissions officers in 20 private colleges were usually satisfied with the performance of GED holders who met the other requirements for admission (e.g., minimum ACT or SAT scores and an acceptable individual scholastic record). The state's 2-year colleges accepted GEDs but required them to follow the same procedures as high school graduates in the lowest quartile of their classes—for example, restricting their first semester courseload to 12 credit hours. Vocational programs accepted GEDs, but many also required specific high school courses.[32]

In addition to opening doors to postsecondary education, GED certification can also help GED enrollees obtain financial aid such as Pell Grants and Guaranteed Student Loans. To receive aid, students must demonstrate financial need and an ability to benefit from aid. As noted earlier, U.S. Department of Education policy provides that possession of a GED credential is one way to demonstrate ability to benefit. Other ways include having a high school diploma or passing another government-approved test.

Large numbers of students, including many GEDs, receive federal grants and loans to help pay for postsecondary education, especially in community colleges, proprietary schools, and public technical colleges. One study (Dynarski 1994) found that 44.2 percent of GED recipients defaulted on Guaranteed Student Loans, as compared to 14.4 percent of high school graduates and 56.2 percent of dropouts. However, students represented in this data set left postsecondary institutions between one and two decades ago, and there have been important changes in the student loan program since then. We have been unable to find more recent data.

Employer Acceptance of the GED

In local survey data from 1977 through 1995, the great majority of employers accepted the GED as a substitute for a high school diploma, and most of them explicitly regarded it as equivalent to a diploma (table 10).

Further, a majority of those responding to two surveys thought that GED recipients performed their work as well as high school graduates. Thiele and Sloan (1984) found that 59 percent of his survey respondents in Illinois consid-

Table 10.—Employer views of the GED

Study	Percent of employers who: Accept the GED	Consider GED equivalent to diploma
Mally and Charuhas 1977 (Illinois)	85	61
El Paso School District 1979 (Texas, 1979)[33]	—	81
Manitoba Govt. 1981 (Manitoba)	65	—
King 1984 (Illinois)	87	72
Carson 1986 (Colorado)	—	83
Pawasarat and Quinn 1986 (Wisconsin)	78	52
Jantzen and Quigley 1982 (Saskatchewan)	100	—
Whitaker 1995 (North Carolina)	92	—
Mean	85	70

—Not available.

SOURCE: Studies in this table.

ered their GED employees generally successful or very successful in their work, and only 0.8 percent considered GEDs less successful than high school graduates.[34] Some 53.9 percent of these employers were equally satisfied with the performance of GEDs and high school graduates; 3.7 percent were more satisfied with the performance of GEDs; and only 0.8 percent were less satisfied with GEDs than with high school graduates. Similarly, 56 percent of the Florida employers responding to Grise and Klein's (1987) survey thought GED recipients performed as well as high school graduates; 4 percent said the GEDs performed better; and 12 percent said they did not perform as well. Their data also indicated that employers thought GED recipients did reasonably well in promotions, retention, and dismissals, though not always as well as high school graduates.

However, many of the employer studies reviewed raise questions about the relevance of all secondary education credentials to many hiring decisions. For example, the El Paso study reported that large numbers of employers did not require high school-level credentials for production jobs. In Illinois, only 15 percent of the employers in Mally and Charuhas's survey said they usually required a high school diploma for employment (i.e., more than 75 percent of the time). In another Illinois study, King observed that "the pattern of responses ... quite clearly suggests that educational credentials ... simply are not very important elements in the hiring decision." Credentials ranked second least important in a list of factors in hiring decisions. Carson noted that in the Denver area "many jobs are available to applicants whether or not they have an educational credential." After surveying employers in North Carolina, Whitaker

observed that "respondents in this study indicated that educational credentials were important but at the same time placed a higher priority on job performance. This researcher wonders if the emphasis placed on high school educational credentials [is] relevant in today's workplace" (p. 104). On the other hand, McClurg reported that while most employers in his study did not require a high school diploma or an equivalency degree, nearly all *preferred* some kind of secondary credential.

A national survey of employers reported by Malizio and Whitney (1985) did find that educational credentials were important in employment practices, but the study covered credentials at both the secondary and postsecondary levels. The value of a college degree in employment decisions is not at issue here. At least two other studies based on national survey data (Stull n.d., EQW n.d.) have concluded that employers pay little attention to secondary school records.

If the saliency of secondary education credentials for employer decisions is low, then the distinction between those with credentials and those without may not be very important, and the signal that an employer receives from either kind of certification may be a weak one.

Further, the fact that employers generally accept the GED as equivalent to a high school diploma does not necessarily mean that their impressions are accurate. The military accepted the GED as an equivalency certificate until research showed that GED recipients had much higher attrition rates than high school graduates. In the civilian labor market, the results of systematic research on outcomes of the GED must be reviewed to see whether certification is systematically related to such things as hiring and wages, after other factors are controlled.

The GED as a Self-Confidence Builder

Research has demonstrated that low self-esteem is associated with an array of negative outcomes (for example, see St. Pierre et al. 1994). People with low self-esteem, especially when linked with low socioeconomic status, are more likely than others to do poorly in school and the labor market and to run afoul of the law. Breaking out of the cycle of low self-esteem and poor performance can be extremely difficult.

Many adult educators believe that passing the GED can help break this cycle by building self-confidence. In so doing, the tests may provide a first step toward improving one's condition. Additional steps may include enrolling in higher education and seeking a better job. What does the research evidence tell us about the GED's effect on self-esteem?

Anecdotal accounts from test administrators and adult educators are replete with references to the enhanced self-esteem of GED recipients, and survey evidence largely confirms these impressions. For example, Mally and Charuhas (1977) found that 88 percent of the GED recipients they surveyed in Illinois said they felt better about themselves as a result of passing the tests. (Only 1

percent said they did not, while 11 percent did not answer the question.) Similarly, Darkenwald and Valentine (1985) reported that 94 percent of the respondents to a followup survey in New Jersey said that feeling better about themselves was one benefit of the tests. In a survey of GED graduates conducted by the Iowa Department of Education (1992), 77 percent said that passing the GED increased their self-esteem "very much," and an additional 18 percent said it increased their self-esteem to some extent. In her survey of GED recipients in Maryland, Reed (1985) found that 73 percent of respondents reported increased self-confidence in their abilities, and 93 percent felt that the program had given them a second chance. Almost 90 percent said that their families were pleased, half felt that their lives had gained more direction, and 43 percent said that they had assumed more responsibility as a result of passing the tests.

Most high school dropouts who pass the GED, then, feel better about themselves, and their increased self-esteem may help them acquire more education, get better jobs, and generally improve their life circumstances. To what extent this new self-confidence endures over the long term is an important question, but one for which there is no answer at present.

POSTSECONDARY OUTCOMES

POSTSECONDARY OUTCOMES

Having examined the functions of the GED, we turn to the postsecondary outcomes of GED certification, beginning with participation. Does acquiring the GED help dropouts get into postsecondary institutions? Compared to high school graduates, what proportion of GED recipients enroll in postsecondary education and training programs, and how well do they do in them? The first section addresses the first question, the following sections, the second.

Postsecondary Enrollments

There is no question that GEDs are more likely to participate in postsecondary education and vocational training than are other dropouts. The number and proportion of dropouts enrolled in degree-granting college programs is minuscule—often reported as zero in the studies reviewed. Some dropouts do participate in vocational-technical and other training programs, but the rates of participation are very low. For example, NCES estimated that 0.5 percent of dropouts among the NELS 1988 eighth-graders had enrolled in postsecondary degree programs by 1994, 3.8 percent had enrolled in or completed certificate programs, and 2.2 percent had enrolled in other postsecondary programs (U.S. Department of Education 1996d).

Moreover, multivariate studies have shown that GED certification predicts participation in college and in training programs, controlling for other factors. Murnane et al. (1997) found that attaining a GED within 4 years of leaving high school was associated with an initial 2 percent increase in the probability of attending college for both males and female dropouts. The magnitude of the increases grew over the next several years, at a greater rate for women than for men." The authors controlled for race/ethnicity, mother's education, age and grade at which the student dropped out, and age at GED attainment.

Garet, Jing, and Kutner (1996) found that receipt of a GED was a strong predictor of years of vocational training acquired, especially for women. This analysis controlled for race/ethnicity, family status, work experience, and local unemployment. Further, Kroll and Qi (1995) showed that GED recipients were three to four times as likely as those who failed the tests to enroll in 2-year or 4-year colleges or vocational schools.

Given that attainment of a GED increases a dropout's chances of getting additional education and training, what proportion of GEDs and high school graduates actually attend college? Several studies based on the NLSY have estimated the enrollment of GED recipients and high school graduates in college, whether in 2-year or 4-year institutions (see table 11). Somewhat over 60 percent of high school graduates, both male and female, had attended college by their late twenties or age 30. NCES estimates of college attendance by 1980 high school seniors are similar (U.S. Department of Education 1997). GED

Table 11.—Percentage of GEDs and high school graduates who attended 2-year or 4-year colleges

Study	Age	Males		Females	
		GED	HSG	GED	HSG
Cameron and Heckman (1993)	25, 28	42	62.6	—	—
Cameron (1994)	30	—	—	33	63
Garet et al. (1996)	28	28.0	61.2	30.3	62.1

—Not available.

SOURCE: Studies in this table.

females in table 11 were about half as likely as high school graduates to attend college: 30–33 percent did so. GED males were also less likely than their high school graduate counterparts to attend, though there is less consistency in the estimates—28 percent and 42 percent. The data in table 11 all come from the NLSY. However, newer estimates based on the 1994 follow-up to the 1988 National Education Longitudinal Study[36] are roughly similar—32.8 percent of GEDs and 73.3 percent of high school graduates in the sample were enrolled in postsecondary institutions at some time during this period.

Greater detail on postsecondary education and on occupational training outcomes of the GED is provided by five national-level studies. Cameron and Heckman (1993) and Cameron (1994) provided detailed breakdowns of postsecondary participation by type of institution. Cervero and Peterson (1982), Kroll and Qi (1995), and Behal (1984) also analyzed postsecondary participation by type of institution. Their work was based on follow-up surveys of GED examinees conducted one and one-half to two years after GED attainment. The response rates were typically low (24 percent, 22 percent, and 35 percent, respectively). The Cervero and Kroll studies had significant nonresponse biases. For example, Cervero and Peterson found that respondents were older, more likely to be female, and more likely to have passed the tests than the population which they represented. The Cervero study and the Kroll study both urged caution in generalizing from their survey results.

Table 12 shows the GED enrollments in 2- and 4-year colleges, vocational/technical institutes, and on-the-job training and apprenticeship programs reported in these studies.[37]

Several observations are in order before we try to interpret these results. First, the college and training estimates in Cameron's study are not mutually exclusive, as they are in the other studies. If a woman attended a community college and a vocational/technical institute, her attendance at both types of institution was counted. Cameron's estimates of education and training experiences are higher than they would have been had he used mutually exclusive categories.[38] Second,

Table 12.—Percentage of GED survey respondents reporting various educational outcomes

Education	Cameron and Heckman (1993) (males)	Cameron (1994) (females)	Cervero and Peterson (1982)	Kroll and Qi (1995)	Behal (1984)
4-year college	15	10	4	6	3
Community/junior	23	23	19	27	16
Vocational/technical	10	30	18	17	17
OJT/Apprentice	3	—	9	6	9
Other education/training	—	9	4	7	11
Other outcomes	50	49	46	37	44

—Not available.

SOURCE: Studies in this table.

Behal's relatively low enrollment rates in 2-year and 4-year colleges are partly explained by the fact that she reported enrollments for GED test takers, while other authors examined enrollments for GED recipients. Those who passed the tests and received GED certification would be more likely to attend college than would all test takers. Third, the Cameron/Heckman and Cameron studies had much longer follow-up periods (8 and 10 years respectively) than the GED studies (one and one-half to two years), a fact that probably helps account for their higher rates of participation in postsecondary education, especially in 4-year colleges.[39]

Despite differences in survey methods, response rates, analyses, and estimates, the broad picture emerging from these data is fairly clear. First, over half of the GED recipients—between 50 and 63 percent—got some additional civilian education or training after they passed the tests, whether in degree-granting colleges, vocational schools, apprenticeship programs, or on-the-job training. In addition, according to Cameron and Heckman, about 10 percent of GEDs entered the military during the period they studied, and enlistees receive occupational training as a matter of course. (Military enlistment is classified as one of the "other outcomes" in table 12. Only Cameron and Heckman broke it out separately.)

Second, most of the education and training that the GEDs received after passing the tests was acquired at the subbaccalaureate level in community colleges and vocational/technical schools. This finding is consistent with our estimate, based on NCES data, that 55 percent of GEDs in postsecondary institutions in 1992–93 were enrolled in 2-year schools and 23 percent were enrolled in less-than-2-year schools.[40]

Third, in choosing among postsecondary education and training options, GED graduates are strongly oriented toward acquiring occupational skills. The majority of community college students are enrolled in occupational programs (Boesel and McFarland 1994), and GED enrollments in vocational/technical schools (including trade schools) and participation in on-the-job training and apprenticeship programs are substantial. GED participation in the military, with its well developed occupational training programs, further strengthens this emphasis. The focus of GED recipients on acquiring occupational skills is understandable, given that most are adults, that many have family responsibilities, and that labor market returns to high school dropouts are declining rapidly (see figure 2, p. 50).

Did GED attainment help these students get additional formal education? It almost certainly did. As we have seen, most postsecondary institutions require some kind of secondary certification for admission, and both bivariate and multivariate studies show that GEDs are much more likely than dropouts without the credential to participate in college or vocational education.

Although the GED clearly increases opportunities for postsecondary education, the share of postsecondary enrollments accounted for by GED recipients declined from 7 percent in 1986 to 4 percent in 1992 (U.S. Department of Education 1996a). The reasons for the decline are not clear, but it was evident in less-than-2-year, 2-year, and 4-year institutions.

Postsecondary Grade-Point Averages

How well do GED recipients perform in postsecondary institutions? One good measure of performance is grade-point average (GPA). Many studies, including a large number of doctoral dissertations, have compared the grade-point averages of GED graduates and high school graduates at specific institutions. The studies have been conducted at different times and locations for a variety of reasons.[41] Thus, it is not advisable to treat them as samples of a larger population. In examining the results of these studies, it is important to consider the ability and motivational mixes of students at different points in the postsecondary educational process. In general, we expect incoming cohorts, such as freshmen, to include a smaller proportion of able and motivated individuals than would be true of graduating seniors, because the less able and motivated students would tend to discontinue their education over time.

To take the effects of this selective attrition into account, we sort studies that compare the grade-point averages of students into three groups: (1) those that examine the performance of beginners—students in the first year of enrollment only, whether the period covered is a quarter, semester, or year; (2) those that examine the performance of postsecondary graduates; and (3) those that examine student performance in any year of college. The third group includes studies of all enrollees (e.g., freshmen, sophomores, juniors, and seniors) in a given time period as well as studies of incoming student cohorts over time. Some studies in the third group include beginners, but this overlap with the first category is unavoidable, because the beginners cannot be sorted out.

Table 13 presents the mean grade-point averages of GED completers and high school graduates, and the ratios of the means, derived from 7 studies of GED performance in postsecondary vocational programs, 15 studies of their performance in community and junior colleges, and 19 studies of performance in 4-year colleges and universities. The data in table 13 are summary statistics for the results of these studies.[42] The full tables containing the relevant data are found in appendix B–4.

As expected, the mean grade-point averages of both GEDs and high school graduates increased with student longevity in these institutions, except between the first year and "all years" in the 4-year colleges. It may be that more rigorous selection procedures in the 4-year colleges identified and excluded weak candidates before admission rather than afterward, in contrast to procedures in 2-year colleges and vocational schools.

The grades of GED students in these institutions were close to those of high school graduates even in the first year. For example, among beginners in 4-year institutions, the difference was roughly that between a C and a low C+. The grades of GEDs and high school graduates (HSG) tended to converge over time, as selective attrition equalized the groups. In vocational programs, which often last only 1 year, this convergence effect was slight; the grade-point averages of GEDs were approximately equal to those of high school graduates both during and at completion of the program. In community colleges, the GED/HSG ratio of grade-point averages increased from .82 to 1.06 upon completion, and in 4-year colleges, it increased from .85 to 1.00. In all three types of schools, GEDs who graduated earned about the same grades as those with regular high school credentials.[43]

GPA Performance in Different Eras

Early studies of the postsecondary performance of GED recipients focused on World War II veterans in 4-year colleges. The GED had been designed for veterans, and they were the primary users of the tests for more than a decade after the war. Over time, however, the number of veterans who were test takers declined, and the number of other test takers increased. By 1959, nonveterans outnumbered veterans as GED examinees.

Veteran and nonveteran GED examinees constituted substantially different populations. The veterans were mostly male and white, and by definition, all had military experience. The nonveteran examinees were second-chance civilians, who were more likely to be female and members of minority groups. The differences in these populations led to speculation that the earlier veteran GEDs performed better in college than the later civilian GED recipients. Our data on the grade-point averages of early and later examinees shed some light on this issue. Table 14 shows the mean GPAs of GED recipients and high school graduates in studies of performance in 4-year colleges before and after 1959, along with the ratios of the GED and HSG means. (There were few community colleges before 1959.)

Table 13.—Grade-point averages of GED recipients and high school graduates (HSG)

Institution type/ student year	Mean GPA		Ratio of means	Number of colleges
	GED	HSG	GED/HSG	
Postsecondary vocational				
Enrollees	2.58	2.71	0.95	17
Graduates	3.09	3.05	1.01	20
Community/junior colleges				
First year	1.85	2.26	0.82	14
All years	2.52	2.57	0.98	19
Graduates	3.21	3.03	1.06	1
4-year colleges				
First year	1.97	2.31	0.85	11
All years	1.90	2.23	0.85	6
Graduates	2.75	2.76	1.00	2

SOURCE: Studies listed in appendix table B-4.

These data do not support the hypothesis that early test takers, mostly veterans, earned higher grade point averages than the later, mostly civilian, examinees. In fact, the data suggest the opposite: the mean GPAs in studies done after 1959 were uniformly higher than those in studies before 1959 for both GED students and high school graduates. The GED/HSG grade ratios are similar over time: the performance of GED students relative to high school graduates in each category (first year, all years, graduates) remained fairly constant in these two periods. The higher GPAs after 1959 may reflect grade inflation at these institutions, rather than better performance, but there is no evidence here that the change in test-taking populations affected the performance of GED students in 4-year colleges.

Postsecondary Persistence and Completion Rates

Typically, GEDs enrolled in postsecondary institutions differ from high school graduates in ways that are related to persistence. One NCES study found that GEDs had an average of 4.1 "nontraditional" characteristics that predicted postsecondary attrition, as compared to 1.2 for high school graduates (U.S. Department of Education 1996a). The characteristics were delayed enrollment, part-time enrollment, full-time employment, financial independence (e.g., lacking parental support), single parent status, having dependent children, and lacking a regular high school diploma. Larger proportions of GED recipients than of high school graduates had all of these characteristics except one (full-time employment).

Table 14.—Grade-point averages of GED recipients and high school graduates (HSG) before and after 1959

Students	Mean GPA		Ratio of means	Number of schools
	GED	HSG	GED/HSG	
First year				
Pre-1959	1.80	2.10	0.86	6
Post-1959	2.01	2.33	0.86	5
All years				
Pre-1959	1.81	2.07	0.87	3
Post-1959	1.98	2.40	0.83	3
Graduates				
Pre-1959	2.37	2.48	0.96	1
Post-1959	3.13	3.04	1.03	1

SOURCE: Studies listed in appendix table B-4.

Because the GED selects primarily on cognitive skills, it is not surprising that postsecondary students with GED certification earn about the same grade-point averages as high school graduates. However, because the test battery does not select on "non-traditional" characteristics or on other characteristics related to persistence, we would expect to see more postsecondary attrition among GED recipients than among high school graduates. The fact that GEDs initially dropped out of high school reinforces this expectation. What does the research tell us about the postsecondary persistence patterns of GED students and high school diploma holders?

Persistence in postsecondary education can be seen as reflecting the extent to which individuals achieve educational goals they set for themselves, such as the attainment of a degree or certificate. It can also be seen as reflecting patterns of continuation within institutions, consonant with institutional goals and regardless of individual goals.[44]

Table 15 shows the individual and institutional degree attainment of GED recipients and high school graduates. The lines in bold print represent individual attainment—students in surveys and studies who met the goals they set for themselves. The lines with astericks represent individuals who exceeded their goals.

The NCES (1996) data show the institutional attainment of respondents in the Beginning Postsecondary Students Longitudinal Survey (BPS) from 1989–90 through the second follow-up in 1994. The NCES (1997) data show the 1994 attainment of BPS students in 2-year and less-than-2-year institutions who specified the kind of credential they were seeking in 1989–90. The data in

Table 15.—Attainment of GEDs and high school graduates, by type of beginning postsecondary program (percentage of beginning students)

Institution or program/ credential/data source	GED (percent)	HSG (percent)	GED/HSG ratio
Vocational programs[1]			
Vocational certificate/graduation			
NCES 1997	**45.0**	**50.7**	**0.89**
Appendix B–5	**56.2**	**62.3**	**0.90**
Associate's degree			
* NCES 1997	1.5	4.9	0.31
Bachelor's degree			
* NCES 1997	0.6	0.5	1.20
2-year colleges[2]			
Vocational certificate			
NCES 1997	15.4	11.1	1.39
NCES 1996	15.1	12.9	1.17
Associate's degree			
NCES 1997	**12.2**	**24.8**	**0.49**
Appendix B–5	**14.9**	**28.5**	**0.52**
NCES 1996	4.3	18.5	0.23
Bachelor's degree			
* NCES 1997	1.6	8.1	0.20
NCES 1996	1.9	6.7	0.28
4-year colleges			
Bachelor's degree			
Cameron and Heckman (males)	**5**	**75**	**0.07**
Appendix B–5	**27.3**	**30.9**	**0.88**

[1] Students in vocational programs at 2-year or less-than-2-year institutions.

[2] Students in all programs at community colleges or all 2-year colleges.

SOURCES: NCES 1996 data are from *The Condition of Education 1996e* (U.S. Department of Education 1996e), table 9–1. NCES 1997 data are from *The Condition of Education 1997* (U.S. Department of Education 1997), tables 11–1 and 11–2 . Cameron/Heckman data are from Cameron and Heckman 1993, table 8.

appendix B–5 are mean graduation rates from local studies of postsecondary students enrolled in credential-granting programs. The Cameron and Heckman (1993) data are for males in the National Longitudinal Survey of Youth, 1979–87; the authors make the reasonable assumption that students who begin degree-granting programs in 4-year institutions intend to graduate.

Examining the lines in bold, we see that GEDs who sought vocational certificates were almost as likely as high school graduates to attain them; those who sought associate degrees were about half as likely to attain them; and male GEDs who sought bachelor's degrees were very unlikely to attain them. (The .88 GED/HSG ratio from appendix B–5 does not carry much weight, because it is based on 4 local studies conducted before 1959. Other studies based on national surveys and examined in this section show that no more than 5 or 6 percent of GEDs in postsecondary institutions earn bachelor's degrees or complete four years of college.)

As might be expected, the data suggest that attainment rates for individuals specifically seeking credentials (individual rates) are higher than for all students in a given type of institution (institutional rates). This is especially evident among beginners at 2-year colleges.[45] Among associate's degree seekers (in bold), 12.2–14.9 percent of GEDs and 24.8–28.5 percent of high school graduates earned the degree. Among all community college beginners (NCES 1996), 4.3 percent of GEDs and 18.5 percent of high school graduates earned an associate's degree.

In general, table 15 shows that the longer it takes to graduate from a program or institution, the smaller the proportion of GEDs who graduate, relative to high school diploma holders. An interesting exception is the roughly one-half percent of GEDs and high school diploma holders who start vocational programs intending to earn a certificate and actually earn bachelor's degrees.

Table 16 presents another measure of institutional persistence—years of college completed by beginners—at all colleges, 2-year colleges, and 4-year colleges. The data do not indicate what the students' educational goals were or whether they earned degrees.

On average, GEDs complete fewer years of postsecondary education than high school graduates. According to Garet's (1996) analysis, almost three-fourths of GEDs at age 28 who began at postsecondary institutions completed 1 year or less, as compared to somewhat over one-fourth of high school graduates. Less than 5 percent of GEDs (males and females combined) completed 4 years or more, as compared to just under one-half of high school graduates. Cameron and Heckman's (1993) data for men and Cameron's (1994) data women at age 30 are consistent with this pattern. (The relatively high GED/HSG ratios for men completing 2 years of college (1.36, 1.19) do not mean that GEDs are more likely than high school graduates to finish 2-year programs. It means that they are a little more likely to complete *just* 2 years of college, not more or less. Cameron and Heckman's data show that 55.7 of high school graduates who

Table 16.—Years of college completed by GEDs and high school graduates (percentage of beginning college students)

Type of institution/ number of years/gender	GED (percent)	HSG (percent)	GED/HSG Ratio
All college beginners (Garet et al. 1996)			
Less than 1 year			
Males	44.0	11.2	3.93
Females	36.8	12.7	2.90
1 year			
Males	31.0	16.7	1.86
Females	36.8	15.6	2.36
2 years			
Males	20.2	14.8	1.36
Females	19.0	18.3	1.04
3 years			
Males	2.2	7.8	0.28
Females	1.6	9.2	0.17
4 years or more			
Males	2.6	49.4	0.05
Females	5.8	44.1	0.13
2-year college beginners (Cameron & Heckman 1993, Cameron 1994)			
Less than 2 years			
Males	73	44.3	1.65
Females	78	60	1.30
2 years			
Males	25	21	1.19
Females	20	30	0.67
4 years or more			
Males	2	34.7	0.05
Females	2	10	0.20
4-year college beginners (Cameron & Heckman 1993, Cameron 1994)			
Less than 2 years (females)	95	28	3.39
2 years (females)	5	22	0.23
4 years or more (females)	0	50	0.00
4 years or more (males)	5	75	0.07

SOURCES: For 2-year and 4-year college beginners, data for males are from Cameron and Heckman 1993, table 8; data for females are from Cameron 1994, table 4. For all college beginners, data are from Garet et al. (1996), exhibits 11 and 12; estimates for high school graduates are weighted averages of those who started college directly after high school and those who delayed entry.

began at 2-year colleges completed 2 years *or more*, as compared to 27 percent of GEDs.)

In all, the data support the hypothesis that GED recipients are less likely than high school graduates to persist in postsecondary education, whether persistence is measured by individual attainment rates, institutional attainment rates, or years of college completed. (Also see U.S. Department of Education 1996b and Murnane et al. 1997.)

Labor Market Performance of GED Recipients

Labor Market Performance of GED Recipients

What are the economic benefits of the GED to high school dropouts? Do GED holders receive earnings comparable to those of high school graduates? In considering questions such as these, it is important to keep a long-term trend in mind. The real earnings of young adults in the United States have been declining for over two decades, and their rate of decline is related to level of education (figure 2).

While college graduates, including those with advanced degrees, came close to maintaining their earnings after an initial decline in the early 1970's, those with less education continued to lose ground. The quantified slopes of the lines in this figure (not shown here) indicate that the rate of decline is negatively associated with education level. Those with the least education and the lowest earnings, the dropouts, are losing ground most quickly.[46] Dropouts would gain substantially if they had the earnings of high school graduates, and the rate at which they are losing ground would decrease somewhat. Nevertheless, they would still be experiencing a long-run decline in real earnings.

To assess the economic performance of GED recipients, we review studies using cross-sectional and longitudinal approaches. A discussion of the strengths and weaknesses of these analytic strategies is found in appendix C.

Cross-sectional Studies

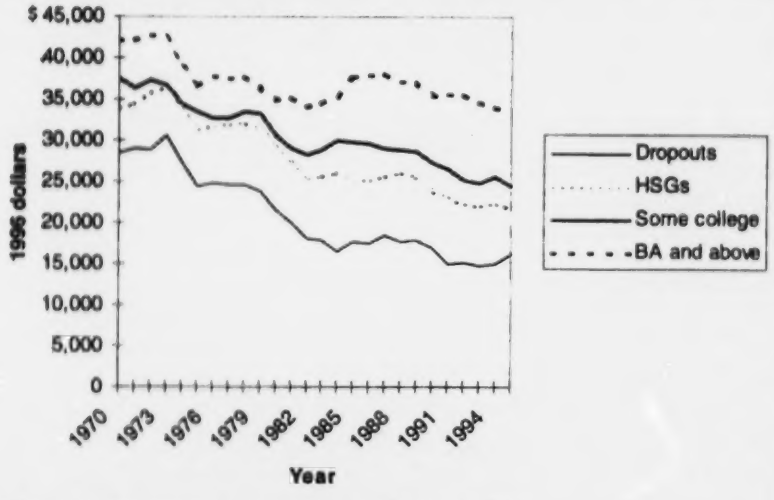
We begin with simple and multivariate analyses of the labor-market performance of GED recipients, then examine the effects of three key independent variables on wages, and finally assess the indirect effects of GED attainment on wages and earnings. The data are found in appendix tables B–6 and B–7.

Labor Force Participation and Employment

Earlier we saw that GED certification enhances self-esteem, and increased self-esteem may prompt greater efforts to find employment. Moreover, GED certification may signal employers that the recipient has better skills than dropouts do. If so, we would expect employers to hire GEDs in preference to dropouts, other things being equal. What does the research tell us about the relationship between GED certification, labor market participation, and employment or unemployment?

Simple comparisons of labor force participation showed that GEDs were more likely than dropouts but less likely than high school graduates to participate (see the "Difference" column in table B–6). However, in controlled analyses the differences among the 3 groups were slight or nil in all but one study (Passmore 1987). Credentials seem to have little effect on labor market participation

Figure 2.—Median annual earnings of male wage and salary workers age 25–34, by level of education



SOURCE: U.S. Department of Education (1996e), table 34-2.

In simple estimates of employment rates, GED males were a little more likely than dropouts to be employed (full-time or part-time). GED females and adults in general (both sexes) were considerably more likely to be employed. High school graduates had higher employment rates than GEDs, whether male or female. One study (Reder 1994) found that GED males and adults of both sexes had higher rates of *full-time* employment than other dropouts.

In controlled comparisons, GED males were 5 percent more likely than dropouts to be employed, and GED adults were about 6 percent more likely to be employed full-time. Male high school graduates and adult high school graduates in general had higher overall employment rates than their GED counterparts. There were no controlled comparisons of employment among females.

Simple comparisons of unemployment rates showed that GED recipients were more likely than high school graduates to be unemployed. Female GEDs were less likely than dropouts to be unemployed (in 2 of 3 studies), though the evidence regarding GED males and dropouts was mixed. The one controlled study of unemployment (Sum 1996) showed that among adults of both sexes, the GED rate is the same as that of dropouts and higher than that of high school graduates.

In general, the studies suggest that while GED attainment has little effect on labor-force participation or unemployment, it seems to increase full-time employment somewhat.

Wage Rates

Much of the research on labor market outcomes of the GED has focused on wage rates. Wage rates reflect what employers are willing to pay an employee and, by implication, the value of the employee's work.[47] In simple comparisons (table B–6), the average wage rates of male GED recipients were between 6 and 19 percent higher than of other dropouts. For females they were between 2 and 13 percent higher, and for adults of both sexes in one study the rate was 14 percent higher.

The results of controlled analyses were similar. The wages of GED males were still 6 to 12 percent higher than those of dropouts; the wages of GED females were up to 13 percent higher; and the wages of GED adults in general were 5 to 11 percent higher. In every study but one, GEDs earned more than other dropouts but less than high school graduates.

In controlled studies, then, GEDs tended to have higher wages than dropouts and lower wages than graduates. However, the introduction of certain controls in some analyses reduced the wage differences between GEDs and dropouts considerably. In one study, for example, introducing controls for level of education, literacy, and work experience reduced the difference between GED and dropout wages from 19 percent to 10 percent (Reder 1994). This suggests that much of the apparent wage effect of GED status may actually be an effect of other pivotal characteristics of GED recipients. Shortly we will examine the extent to which, and ways in which, key variables such as these affect the wages of GED recipients.

Time Spent Working

Wage rates indicate the value of an employee's skills, but if he or she chooses not to work very much or is not able to find work, the economic benefit of these skills will be limited.

Simple and controlled comparisons of time worked (e.g., hours per week) and work experience (total weeks) tell a fairly consistent story (table B–6). GED males work less than or about the same amount as dropouts. GED females work more than dropouts. High school graduates, in turn, work more than GEDs, regardless of sex. Simple comparisons of job tenure for the three groups reveal a similar pattern—male GEDs have less tenure than dropouts, females have more, and high school graduates of both sexes have more than GEDs.[48]

Analysts disagree about whether the greater number of hours worked by GED females, as compared to dropouts, is due to the credential. Cao et al. (1993) and Cameron (1994) concluded that the differences between GEDs and other dropouts were not statistically significant. Cameron suggested that "all differences in the annual labor supply and accumulated work experience are governed by differences in fertility and marital decisions."

On the other hand, Maloney (1993) found that for women there were labor supply effects of obtaining a GED (or a high school diploma). He concluded from two controlled analyses that "the average dropout would see her actual hours of work rise by 17.6 and 17.3 percent with a high school diploma and 8.0 and 6.4 percent with a GED degree."[49]

In sum, GED males tend to work less than or about the same amount as dropouts and experience more job turnover. GED females tend to work more than dropouts and have less turnover, but there is disagreement about whether their increased working time is a result of GED attainment. GEDs in general tend to work less than high school graduates and have more turnover.

Annual Earnings

Annual earnings are affected by both wage rates and time worked and so represent a useful composite labor market outcome. In simple comparisons, the average annual earnings of male GED recipients were up to 19 percent higher than those of other dropouts; those of females were 4 to 29 percent higher; and those of adults in general were 20 to 31 percent higher (table B–6). The earnings of GEDs were consistently lower than those of high school graduates.

Controlled comparisons of annual earnings are found in three studies—Sum (1996), Cave and Bos (1994), and Tyler et al. (1997).

Sum's analysis of NALS data controlled for literacy, educational attainment, school enrollment status, marital status, and race-ethnicity, among other things. He found that GED males with no further education earned 13 percent more than dropouts, and GED females, 21 percent more. The magnitude of these differences, even after controlling for the higher literacy skills of GED recipients, is substantial. However, the GEDs still earned less than high school graduates.

Cave and Bos (1994) presented evidence from an experiment designed to evaluate the effect of JOBSTART, an education and training program for high school dropouts, all of whom were reading below the eighth-grade level. One component of the program was many hours of basic education, along with encouragement and assistance in getting a GED credential. Among the experimental JOBSTART group, 36 percent obtained the GED, compared to 21 percent in the control group. Combining the GED recipients in both groups and comparing them to nonrecipients in both groups, the authors found that the GEDs earned $12,766 compared to $9,405 for the nonrecipients during the third and fourth years of the program. This is a substantial difference, but the groups were not balanced with respect to many individual characteristics. To alleviate the possible bias, the authors used membership in the experimental group as an instrumental variable to predict receipt of the GED. Although the resulting estimates were not statistically distinguishable, the magnitudes of the estimates were similar to those of the simple comparison between GED recipients and nonrecipients.

Using data from the GED Testing Service and the Social Security Administration, Tyler et al. (1997) conducted a natural experiment to assess the effect of GED attainment on annual earnings. They compared the earnings of dropouts who passed the GED in states having relatively low passing standards with the earnings of other dropouts who took the test and received the same scores but did not pass because they lived in states with relatively high standards. This approach enabled the researchers to compare outcomes for dropouts having the same motivation to take the test and the same cognitive skills, some of whom received GED credentials (the treatment group) and some who did not (the controls), by virtue of the states they happened to live in.

Five years after taking the tests in 1990, white GED recipients earned 10–19 percent more than controls (in 3 experiments), but nonwhite GEDs gained no earnings benefit.[30] GED earnings gains increased year by year but were relatively low or negative in the first 2 years after attainment of the credential. The authors think that GED certification affects earnings by increasing opportunities for additional education and training, stimulating job search, and signalling skills to others. The relatively low returns to the GED in the first 2 years may be opportunity costs of acquiring more education and training.

In general, this research shows that GED recipients earn more than comparable dropouts and indicates or strongly suggests that a major factor in the increased earnings is the additional education and training that the GED enables recipients to acquire.

Key Control Variables

The GED certifies one form of accumulated human capital—basic cognitive skills. Education contributes to these skills and, arguably, to noncognitive forms of human capital such as perseverance and work ethic. Thus we might expect that level of education and test scores would account for much of the GED effect on labor market outcomes such as wages. In this section we examine the relationships between three key independent variables and wages. The variables are years of secondary schooling, higher education attainment, and aptitude test scores. Appendix table B–7 contains the data for this section.

Years of Secondary Education

High school graduates have more education than GEDs, who in turn have more than other dropouts. It may be that years of schooling explain the wage differences between the three groups. When years of schooling are controlled in an analysis of the effects of the high school diploma (which certifies 12 years of schooling), what remains is sometimes called a certification or "sheepskin" effect.

In Cameron and Heckman's (1993) analysis, GEDs had a mean 10.40 years of schooling, compared to 9.46 years for dropouts, and of course, 12 years for high school graduates. Excluding those with any higher education, the authors found

that the wage differences between male diploma graduates, GEDs with 11 years of schooling, and dropouts with 11 years of schooling were much smaller than those between all male diploma graduates, GEDs, and dropouts.[51] When the authors added years of schooling to a model that included race and ethnicity, the wage coefficients of the GED and the high school diploma fell to near zero, except for high school graduates at age 28. Across all groups, the coefficients were jointly insignificant, suggesting that there was no additional "sheepskin" or certification effect of either credential on wages.

Murnane et al. (1995) reported findings similar to those of Cameron and Heckman. Their sample of male GEDs had a mean 9.12 years of schooling and dropouts had 8.79 years. Their analysis found 4 percent higher wages for each additional year of schooling completed, controlling for race, ethnicity, and mother's education. Once years of schooling were taken into account, GED certification had no additional effect on wages.

Cameron (1994) reported that among females at age 25, GEDs had a mean 10.3 years of schooling, compared to 9.5 years for dropouts. He found that earnings rose with years of schooling, as Cameron and Heckman did for males. Unlike Cameron and Heckman, however, he found that for females at ages 25, 28, and 30, high school graduates did earn more than GED recipients and other dropouts with 11 years of schooling. Also, GED recipients with 11 years of schooling earned significantly more than similar dropouts at ages 25 and 28. The findings for females at age 30 were in the same direction, but not significant.

Cao et al. (1993) reported that for women aged 22–29, each year of additional schooling completed was associated with $0.38 higher hourly wages. After adjusting for years of schooling, the difference in hourly earnings between diploma graduates and GED graduates fell from $0.33 per hour to an insignificant amount in the opposite direction. That is, the wage difference between GEDs and high school graduates was attributable to their respective years of schooling. However, controlling for years of schooling did not eliminate the wage difference between GEDs and other dropouts. Rather, the difference fell from $1.50 to $0.47 per hour. Other attributes of the two groups, or their situations, must explain the remaining difference.

In summary, among males of similar race, ethnicity, and maternal education, all differences in hourly earnings between the three groups can be accounted for by differences in years of secondary schooling completed. Neither the high school diploma nor the GED have a "sheepskin effect." Among females, some, but not all, of the wage differences can be accounted for by years of schooling, leaving open the possibility that there may be some GED credential effect.

Higher Education Attainment

Completion of education beyond high school is also an important predictor of wage rates. Diploma graduates are more likely to complete postsecondary education than GED recipients, and GED recipients are much more likely than other dropouts to participate in higher education. The fact that high school

graduates have higher wages than GEDs, who in turn have higher wages than dropouts, may be due to the amount of postsecondary education each group receives, rather than to their secondary credentials, or lack of them. By comparing the wages of groups who have no higher education, or by controlling for the amount of postsecondary education that individuals with different secondary credentials receive, we can better assess the direct wage benefits of the GED.

Cameron and Heckman (1993) compared the wages of GED males with those of dropouts and high school graduates and then added indicators of postsecondary completion—2 years with a GED, 2 years with a diploma, and neither. Including these variables reduced the estimated difference in hourly wages between the groups. For 25-year-old males, the difference between dropouts and GEDs declined a little, from -6.7 to -5.8 percent; the difference between GEDs and high school graduates dropped from +16.2 percent to +8.8 percent. (The negative signs denote lower earnings than GEDs, the positive signs, higher earnings.) An analysis of the wages of 28-year-old males produced similar results.

Cameron (1994) estimated the hourly wages of females at age 25, first including and then excluding those with any formal schooling beyond high school (and those actually in school). The exclusion reduced the difference between GED wages and those of dropouts from -11.1 percent to -9.7 percent, and it reduced the difference between GED wages and those of high school graduates from +19.1 percent to +9.1 percent. Results were similar for 28-year-olds. Adding other control variables in a regression equation changed these results very little.

Maloney (1993) found differences similar to Cameron's among the three groups of women he examined, once those with postsecondary education were excluded from the analysis.

Variation in postsecondary attainment helps explain the wage differences between GED recipients and diploma graduates. To a lesser extent, variation in postsecondary attainment helps explain the difference between GED recipients and other dropouts. Nevertheless, the GED is still associated with increased wages vis-a-vis dropouts after the effect of postsecondary education is taken into account.

Cognitive Ability

GED recipients have about the same cognitive skills as high school graduates and considerably more than other dropouts. Therefore, we expect that controlling for cognitive ability, as measured by aptitude tests, will greatly reduce the wage differences between GEDs and dropouts but will reduce the difference between GEDs and high school graduates much less. Moreover, by statistically removing cognitive ability from a credential that represents cognitive ability and certification, we are left with a GED sheepskin effect plus the effect of any unmeasured characteristics of GED recipients.

Cameron and Heckman (1993) estimated wage models for males, controlling on standard background variables and then adding AFQT scores. The difference in hourly wages between dropouts and GED recipients changed from -5.8 percent for 25-year-olds and -6.0 percent for 28-year-olds to +3.9 percent and +2.0 percent, respectively (dropouts earning more than GEDs). The differences between GEDs and high school graduates were less affected by introducing AFQT as a control: they fell from +8.8 and +11.9 percent to +7.3 and +10.5 percent. With the relatively small samples of GED recipients in the NLSY, neither the wage differences between groups nor the changes in differences passed conventional tests of statistical significance.

One finds the same pattern for females in Cameron's 1994 study. After estimating wage equations, controlling for standard background variables, he added AFQT as a control. Once again, the addition of AFQT to the equation reduced the wage differences between GEDs and dropouts to near zero, or to a positive advantage for dropouts, while reducing the differences between GEDs and high school graduates only a little. For example, among females at age 28, the difference between GEDs and dropouts fell from -7.8 percent to +1.9 percent, while the difference between GEDs and high school graduates dropped from +16.2 percent to +13.4 percent with the introduction of the AFQT variable.

The results of Garet, Jing, and Kutner's (1996) analysis are largely consistent with these findings, though there are differences. The authors estimated log hourly wage rates for GEDs and high school graduates at age 28, controlling for demographics, work experience, and local unemployment rates. Both groups were compared to high school dropouts. Adding an ASVAB composite score to the equation caused the GED coefficient for males to fall from a statistically significant .10 to a non-significant .046. For male high school graduates, the diploma coefficient dropped from .18 to .101 (both significant) with the introduction of the ASVAB composite. The coefficients for female high school graduates also dropped, but the change cannot be attributed entirely to the ASVAB.[52]

Maloney (1993) treated select ASVAB scores as a measure of cognitive achievement reflecting human capital accumulation. He attempted to estimate the direct effects of GED certification and of a high school diploma on the wages of females age 23–31, and to estimate their indirect effects on wages through the ASVAB.[53] Dropouts were the comparison group. Like Cameron and Heckman, Maloney found no significant direct effect of GED certification on wages after the ASVAB variable was included in the regression. The introduction of the ASVAB variable also reduced the direct effect of high school graduation, sometimes to nonsignificant levels.

In the Cao et al. (1993) analysis of females, the introduction of AFQT scores made the differences between the wages of high school graduates on the one hand and GEDs and dropouts on the other nonsignificant. The coefficient for the difference between GEDs and high school graduates (-.22) was smaller than the coefficient for the difference between dropouts and graduates (-.47).[54]

Reder (1994) estimated the effects of the GED on wages directly and indirectly through a measure of cognitive skills, in this case, National Adult Literacy Survey scores in Oregon. Comparing GEDs to other dropouts, and controlling on a number of variables, he found a .107 GED effect on wages. Of this total, .047 or 44 percent was an indirect effect through literacy, and the remainder was a direct effect of the GED.[33]

As expected, the introduction of cognitive ability as a control greatly reduces or eliminates any wage differences between GEDs and dropouts but has a smaller effect on differences between GEDs and high school graduates. Controlling on ability statistically removes the GEDs' primary advantage over other dropouts—their greater cognitive skills, the basis on which they were selected as GEDs. On the other hand, because the cognitive skills of GEDs are fairly close to those of high school graduates, the difference in their wages is less affected by the introduction of ability as a control.

These analyses of the effects of secondary schooling, higher education, and cognitive ability suggest that accumulated human capital, reflected here in level of education and aptitude scores, accounts for most of the wage differences among high school graduates, GEDs, and dropouts.

Indirect Effects of the GED

Although GED certification shows little direct effect on wages, once education level or ability are controlled, the credential may affect wages indirectly by increasing access to postsecondary education. GED recipients who take advantage of that access may receive higher wages because they have better skills. As we saw earlier, the study by Tyler et al. (1997) suggested that GED certification works through additional education and training to increase earnings. Since job tenure and work experience also tend to increase wages, we would expect to see an indirect effect through them, as well.

Indirect Effects through Additional Education and Training

Cameron and Heckman (1993) reestimated a regression predicting log hourly wages for males at ages 25 and 28 by adding variables for further education and training. As table 17 shows, they found that most of the effect of the GED on wages was through education and training after high school. Estimating a similar regression model for females, Cameron (1994) found that from 23 to 58 percent of the total effect of the GED was indirect through further education and training (table 17).

In a multivariate analysis with controls for race, work experience, and unemployment, Garet, Jing, and Kutner (1996) estimated the indirect effects of postsecondary education on log wages through higher education. Dropouts were the omitted category. The authors found that completing some college (up to two years) was associated with a 6 percent wage increase for male GED recipients and a 7 percent increase for male high school graduates. Female high

Table 17.—Indirect effects on log hourly earnings of GED and diploma completion through further education and training and job tenure and experience

Study	Population/ sample	GED			Diploma		
		Total effect	Total direct	Total indirect through further education and training	Total effect	Total direct	Total indirect through further education and training
Cameron and Heckman (1993), table 16	Males age 25	0.069	-0.003	0.072	0.197	0.129	0.068
Cameron and Heckman (1993), table 16	Males age 28	0.065	0.024	0.041	0.249	0.142	0.017
Cameron 1994, table 13	Females age 25	0.107	0.082	0.025	0.272	0.168	0.104
Cameron 1994, table 13	Females age 28	0.107	0.052	0.055	0.369	0.202	0.167
Cameron 1994, table 13	Females age 30	0.106	0.044	0.062	0.386	0.200	0.186
				Total indirect through tenure and experience			Total indirect through tenure and experience
Cameron and Heckman (1993), table 9	Males age 25	0.060	0.071	-0.011	0.144	0.108	0.036
Cameron and Heckman (1993), table 9	Males age 28	0.062	0.115	-0.053	0.174	0.154	0.020
Cameron 1994, table 8	Females age 25	0.102	0.064	0.038	0.189	0.071	0.118
Cameron 1994, table 8	Females age 28	0.081	0.053	0.028	0.231	0.081	0.150
Cameron 1994, table 8	Females age 30	0.069	0.018	0.051	0.238	0.086	0.152

NOTE: Indirect effects through tenure and experience are calculated by comparing coefficients on high school completion status in equations including and excluding tenure and experience. Indirect effects through further education and training are calculated by multiplying the coefficients of the education and training variables by the proportion of the group that completed that level of education. See footnotes to tables 16 and 17 in Cameron and Heckman (1993).

school graduates benefitted from some college, with a 9 percent increase in wages, but female GEDs did not. The authors further found that completing two years of college was associated with wage gains of 10 percent and 8 percent for male GEDs and high school graduates, respectively, and 27 percent and 19 percent for their female counterparts.

Indirect Effects through Tenure and Work Experience

Like higher education, accumulated work experience is a strong determinant of hourly wage rates, particularly for people early in their careers, and time in the current job (tenure) has an even stronger relation to wages. However, as we saw earlier, male GEDs tend to have less tenure and work experience than even dropouts, while female GEDs have more. Thus we would expect female GEDs, but not males, to gain wage benefits indirectly through these factors.

Cameron and Heckman (1993) and Cameron (1994) investigated these indirect effects, following a two-step procedure. The first step, which did not control for tenure and experience, yielded total effects of the GED and the high school diploma on hourly wages. The second, which did control for tenure and experience, yielded direct (or partial) effects. The difference between the total effect and the partial effect was the indirect effect of the GED or the high school diploma on wages through tenure and experience.[36]

As table 17 shows, the authors found that for 25-year-old males, including tenure and experience in the equation *increased* the effect of the GED from 0.060 to 0.071, rather than reducing it. This occurred because (as we saw in table B–6) the male GED recipients in these studies had less tenure and experience than other dropouts, and this deficit tended to lower their wages. Once tenure and experience were controlled, the wages of GEDs vis-a-vis dropouts increased. In fact, it was the dropouts who experienced a positive and indirect effect on wages through tenure and experience.

For similarly aged females, however, Cameron found that including tenure and experience in the equation decreased the effect of receiving the GED, as expected, from 0.102 to 0.064. For these females, the author estimated that between 37 and 74 percent of the total effect of the GED on wages was indirect through greater tenure and experience.

In sum, both male and female GEDs receive indirect wage benefits from their certification through additional education. Female GED recipients also benefit indirectly through additional tenure and experience. Male GEDs, however, do not increase their wages through tenure and experience, because they have less than dropouts in these studies.

Longitudinal Analyses

We turn from cross-sectional analyses, which compared the labor market performance of GEDs, dropouts, and high school graduates at points in time, to longitudinal analyses which examine the performance of GEDs (and usually

dropouts) before and after attainment of the credential. We begin with analyses based on the NLSY, then review evidence from two evaluations, and finally examine data from follow-up surveys of GED recipients.

National Longitudinal Survey of Youth (NSLY) Data

Cameron and Heckman (1993) identified 107 males in the NLSY who were employed both before and after receiving a GED certificate. They found that hourly wages increased from $6.18 per hour the year before receipt of the GED to $6.36 per hour the year after; hours worked per year increased from 1,541 to 1,563. Neither of these differences was large enough to be statistically significant, given the sample size.

Cameron (1994) used before and after evidence to study the effect of GED attainment for females. His method was to pool all observations on hourly wages during the sample period, 1979–80, for people who had not completed any college. If an individual obtained a GED at any time during this period, a variable indicated whether the wage observation occurred before the GED or afterward. The author examined wages for high school dropouts, GED recipients, and high school graduates, controlling for age, ethnicity, year, and local unemployment rate.[57] Cameron found that these female GED recipients earned on average 10.8 percent more than dropouts before getting the GED and 12.1 percent more afterwards. In another specification of the model, he controlled for accumulated work experience and months of training (vocational, company-provided, and apprenticeship) to remove indirect effects. With this specification, he found that GED recipients earned 5.1 percent more than other dropouts before and 5.9 percent more after earning the GED. These slight changes were insufficient to permit a conclusion that GED recipients increased their earnings after receiving the GED.

Murnane et al. (1995) also studied the effect of GED certification for males in the NLSY. Their method was to pool all hourly wage observations for people who dropped out of high school, including those who later passed the GED. One variable identified individuals who obtained a GED at any time during the sample period; another variable indicated whether the observation occurred before the GED or afterwards.[58] The specification of the model included labor force experience and an interaction between experience and receipt of the GED.

Analyzing data separately for whites, blacks, and Hispanics, the authors found that the GED had a positive effect on the rate of wage growth. There was no initial effect, but over time, GED wages grew more rapidly than they would have had the individuals not received GED certification. Hours worked per year also dropped initially after receipt of the GED, but then climbed faster than before. However, the change in hours worked was slight, and the authors were unable to reject the null hypothesis that acquisition of a GED had no impact on labor supply. They suggested that the GED's observed positive effects on wages may be indirect, through additional training and job search. The authors emphasized

that the GED wage effects, while positive, are modest and do not provide a powerful tool for reducing poverty.

The findings in this study parallel those in Tyler et al., showing that the GED yields economic benefits and that the benefits increase over time. Both studies suggest that the GED may work through additional education and training, and through job search, to increase compensation.[59]

Evaluations

Earlier we discussed Cave and Bos' (1994) analysis of the JOBSTART program, which was designed to help high school dropouts reading below the eighth grade level. The program provided many hours of basic education instruction and encouraged participants to take the GED Tests as a culmination and validation of their efforts to improve their skills. Bos (1995) used monthly data collected over a 4-year period to help evaluate the program. He pooled the 48 months of data for each of approximately 2,000 participants in the evaluation (half from the experimental group and half from the control group). His model treated current monthly earnings as determined by level of involvement in basic education during the month, accumulated time in basic education up to the beginning of the month, possession of a GED credential, and other factors. He reported that having the GED was associated with $47.37 higher monthly earnings for males and females combined. His methodology made use of individual fixed effects, which capture effects of unobserved characteristics of an individual that are unchanging over time.

Bos (1996) also evaluated New Chance, a national demonstration project for mothers on welfare. Enrollment in the program was limited to young women who were teenagers when they had their first child, who were receiving AFDC, who had not completed high school, who were between 16 and 22 years old at baseline, and who were not pregnant. Bos' analytic approach was similar to the one employed in the analysis of the JOBSTART data. He pooled 42 months of data on earnings, weeks of education (basic education, training, and college), and receipt of credentials (GED, diploma, trade license certificate), and he employed individual fixed effects to capture the effects of unobservable characteristics. Bos found that receipt of the GED was associated with $29.24 higher monthly earnings. He also estimated models with a term to capture the effect of age on earnings and another to account for number of children. The GED effect only fell to $27.31. Finally, he added a term for weeks of work since enrolling in the project. The GED effect fell further to $22.60. However, these estimates represented 8 to 10 percent increases in earnings, as the average sample members earned $280 in the last month of the follow-up.

These GED effects on earnings are net of the effect of adult basic education on earnings. Bos found that weeks of basic education were negatively associated with earnings, possibly because a person tends to work less in order to participate in basic education. On the other hand, Bos found strong positive effects of weeks in job training and obtaining a trade license. Simulating the cumulative

effects of education and education credentials on 42-month earnings, he estimated that a combination of 26 weeks of basic education and a GED credential had a small negative effect, whereas 26 weeks of basic education, a GED credential, 26 weeks of job training, and a certificate had a large positive effect. Bos also found positive effects for the combination of basic education, a GED, and 2 years of college. He concluded that "because remedial basic education and a GED are often considered necessary to gain access to more advanced training opportunities, they may be useful components of programs for young school dropouts. However, participants should be made aware that basic education has little value by itself and should be strongly induced to pursue post-GED training and credentials."

The evidence from JOBSTART and New Chance suggests the GED credential may be an important part of a strategy for disadvantaged high school dropouts to improve their economic position. The strategy is to obtain the basic or remedial education needed to pass the GED and through the GED to obtain further job-related training and associated credentials.

Evidence from GED Follow-up Studies

Follow-up surveys have been used to learn about such things as the subsequent employment and education of GED examinees, together with the respondents' views of the benefits or disappointments of participating in the tests. These surveys often provide before and after comparisons based on respondents' perceptions and judgments. Some provide nonGED comparison groups, but most do not, and most have significant methodological limitations.[60] One study that used a comparison group (Kroll and Qi 1995) showed that the wages of GED recipients increased more after the test than those of GED examinees who did not pass the tests. The studies and some of their results are described in appendix D.

Eight of these studies provided before and after information on employment for GED recipients. Seven of the eight showed that full-time employment rates increased after receipt of the GED. Part-time employment rates went down or stayed about the same, and most unemployment rates went down. Since people's chances of finding employment increase with age (up to a point), we cannot tell whether or to what extent receipt of a GED was a factor in the observed gains.

The increase in all employment and full-time employment is consistent with the results of the controlled analyses in table B–6 (examined earlier). The decrease in unemployment rates is consistent with the simple comparisons in table B–6, but not with the findings of the more sophisticated multivariate analyses, and preference has to be given to the results of the latter. In short, these findings from the GED followup surveys tend to support the conclusion that GED attainment increases employment opportunities.

THE GED AND THE U.S. ARMED FORCES

THE GED AND THE U.S. ARMED FORCES

The U.S. Armed Forces is one of the largest employers and trainers of America's young people. Each year about 200,000 men and women are selected for active duty enlisted positions in the Army, Navy, Air Force, and Marines. By one estimate, some 10 percent of GED males in the NLSY cohort entered the military between 1979 and 1986, as compared to 5 percent of high school diploma graduates (Cameron and Heckman 1993). Current estimates place the enlistment rate of GED holders at around 7–8 percent.[61]

In the 1970s and early 1980s, as much as one-third of an entering cohort of enlistees left military service before the end of their contracted enlistment term (Buddin 1984, Laurence 1987). These early departures constituted a serious problem for the military. Most enlisted positions require occupational and technical training, and the military services themselves shoulder the cost. Attrition is costly to both the military and the taxpayer—estimated at $18,400 per premature separation in 1987 dollars (Laurence 1987).

Often, too, attrition is a reflection of behavior detrimental to the military's functioning. While some dismissals are the result of medical disabilities and other nonpejorative causes, as many as 80 percent of enlisted dismissals occur for adverse reasons, including ineptitude, behavior disorders, alcoholism, motivational problems, acquired civil court convictions, drug use, financial irresponsibility, and other misconduct (Laurence 1993, Laurence, Ramsberger, and Arabian 1996).

For these and other reasons, the military seeks to reduce attrition as much as possible. One means of doing so is to recruit individuals who, based on personal characteristics, have a relative high probability of completing their first term of service.

Studies conducted by the military since 1959 have examined the impact of demographics, background experiences, high school completion status, and cognitive ability on first-term attrition. These studies have shown that of the measures available to the military, the high school completion status of recruits is the single best predictor of attrition, even after controlling for age, cognitive aptitude, and other personal characteristics (e.g., Buddin 1984; U.S. Department of Defense 1974; Elster and Flyer 1981; Flyer 1959; Laurence 1984, 1987; Sinaiko 1977; Toomepuu 1981). Historically, failure to complete the first term of service has been approximately twice as likely among nongraduates as among high school graduates (Elster and Flyer, 1981).

Initially, GED recipients were classified along with regular high school graduates in the preferred group of applicants for enlistment. In the late 1970s, however, all four services changed their enlistment classification of GED credential holders, consistent with accumulating research evidence showing that the

attrition rates of GEDs were close to those of high school dropouts (Means and Laurence 1984). The military services became reluctant to enlist GED recipients. GEDs, other high school equivalency certificate holders, and non-high school graduates were, and are, required to attain higher scores on the AFQT than high school diploma graduates (Laurence 1993). The 1981 Defense Authorization Act even placed a ceiling on the annual proportion of recruits that could be enlisted without regular high school diplomas (Eitelberg et al. 1984). Consequently, the services have enlisted fewer GED holders and more high school graduates as a proportion of all recruits (Means and Laurence 1984).

In the early 1980s, some members of the education community, as well as the general public, voiced concern over the military's differential aptitude standards for holders of different educational credentials. For example, the American Council on Education raised questions about the military's treatment of people with nontraditional credentials. In response, the Department of Defense contracted for a comprehensive study of the background factors, self-reported experiences, and military performance records of enlistees with different statuses of high school completion (regular diploma, GED, no credential). The study confirmed earlier findings that of all the variables examined—age, race, AFQT score, sex, marital status, and others—completion of high school was the single best predictor of first-term completion. High school completion status remains an efficient and effective screening tool for the military services. Although the military's screening policies with regard to educational credentials remain controversial, the robustness of their relationship to attrition has allowed the changes to endure over time.

Table 18 pulls together data on attrition rates of GED recipients, high school graduates, and high school dropouts in various years between 1977 and 1989.

For each of the years listed between 1977 and 1983, the 36-month attrition rates for GED holders were just about twice those of regular high school diploma graduates and close to those of high school dropouts. For example, in 1983, attrition rates were lowest for regular high school graduates (22 percent) and far higher for GED holders and those without a high school credential (45 and 52 percent, respectively).[62] These patterns are similar across military services and are similar to those in earlier and later studies (Elster and Flyer 1981; Means and Laurence 1984; Laurence 1993).

Why is high school completion status such a powerful predictor of attrition? Laurence (1984) observes that the social attributes and experiences that enable a student to complete high school may be the underlying trait associated with an individual's probability of fulfilling the first term of service. That is, perseverance, maturity, successful participation in group learning situations, team spirit, tolerance of and adaptability to rules and regulations, determination, self-control, and other similar attributes may be the true predictors of persistence in the military, rather than whatever educational attainment is represented by the diploma (Laurence 1984, 1993).

Table 18.—Attrition rates for nonprior service enlistees, by enlistment year and high school completion status

High school completion status	36-month attrition rate (males)					24-month attrition rate
	1977	1978	1979	1982	1983	FY 1988–89
High school diploma graduate	23.1	21.6	22.4	23.1	22.0	20.0
GED	44.3	43.9	45.0	44.8	45.4	36.8
Nonhigh school graduate	46.7	39.8	42.7	49.2	51.5	38.6
	Percentage point difference					
Difference between GED and regular high school diploma graduate	21.2	22.3	22.6	21.7	23.4	16.8
Difference between nongraduate and regular high school diploma graduate	23.6	18.2	20.3	26.1	29.5	18.6

SOURCE: For 36-month rates, Laurence 1987, tables 4 and 6. For 24-month rates, Laurence 1993, table 1.2.

Although earning a GED may signal that an individual is motivated and has the basic cognitive skills of a high school graduate, it may not signal that the individual has developed or internalized the skills needed to be successful in a highly structured environment such as the military. Variability in the attrition rates among enlistees with other types of high school completion credentials lends some support to this view. Table 19 lists the 24-month attrition rates of individuals who enlisted without high school diplomas by branch of military service and high school completion status.

Enlistees who persisted through two or more years of college, even though they had not earned a high school diploma, had the lowest attrition rate, 20.4 percent. High school graduates had the next lowest, 22.5 percent. In the midrange were holders of a variety of different certificates requiring some sustained effort to attain. At the low end of the range, GED recipients had a 40.9 percent attrition rate, and other dropouts, a rate of 42.9 percent.

Given the differences in these attrition rates, one could argue that attrition is associated with both the degree of formal structure in the enlistee's education and the length of time it takes to complete that education. The types of skills and attitudes required to complete a regular high school diploma or two full years of college may be similar to the skills and attitudes necessary to succeed in the military. By earning a regular high school diploma, or another credential

Table 19.—Twenty-four month attrition rates for FY 1988–93, by education credential and service

Education credential	Total	Army	Navy	Marine Corps	Air Force
Nonhigh school graduate	42.9	41.3	44.5	38.1	31.8
GED	40.9	40.5	42.2	43.5	30.1
Home study diploma	38.2	*36.9	38.1	38.8	—
Adult education diploma	36.8	35.7	38.6	33.2	34.3
Correspondence school diploma	36.2	*29.2	*23.8	41.4	*0.0
College-one semester (no high school diploma)	36.0	38.0	37.1	35.3	**15.3
High school certificate of attendance or completion	33.9	35.7	37.7	33.2	13.0
Occupational program certificate	29.4	31.3	26.1	*44.0	29.7
Regular high school diploma	22.5	23.6	23.2	23.2	18.0
College-2 years or more (no high school diploma)	20.4	21.6	20.6	24.1	14.8
			Percentage point difference		
Difference between GED and regular high school diploma graduate	18.4	16.9	19.0	20.3	12.1
Difference between nongraduate and regular high school diploma graduate	20.4	17.7	21.3	14.9	13.8

—Not available.

*Fewer than 30 enlistees in this education credential X military service category.

**May include traditional high school diploma graduates with at least one semester of college.

SOURCE: Laurence, Ramsberger, and Arabian 1996, table 3.

requiring the same degree of discipline and persistence, an individual can demonstrate the ability to persevere in a formalized and structured environment—a characteristic likely to be desirable in both military and civilian organizations. Holders of an occupational program certificate or high school certificate of attendance or completion may be demonstrating that they have internalized some of these characteristics, although not to the extent that regular high school graduates have. Holders of other types of credentials may have internalized fewer of the social skills necessary to succeed in the military.

By raising the required AFQT score for GEDs seeking to enlist, the military can restrict the number of GEDs admitted and thus reduce overall attrition. However, it is doubtful that increased AFQT scores ensure better retention rates for those GEDs who are accepted by the military. Laurence (1984, 1993) notes that tested aptitude, as measured by AFQT, is inversely, if weakly, related to retention.[63] While aptitude scores do not predict attrition, education differentials can help in selecting among the higher risk, and thus less preferred, candidates. Aptitude test scores are used primarily to gauge ability to absorb military training and perform the necessary job skills, while education level is used mostly as an index of social adjustment (Flyer and Elster 1981; Laurence 1987; Toomepuu 1981). After doing extensive research on attrition, in 1987 the military services recategorized education credentials into three tiers (Laurence 1993; Laurence, Ramsberger, and Arabian 1996). Figure 3 shows the classification system.

For the first time, all the services began categorizing high school credentials in the same way, although each independently determined its own enlistment standards and the enlistment priority of each tier. This system remains largely intact today, with the exception of adult education diplomas, which were moved into the first tier in 1988 after intense lobbying by the adult education community and its friends in Congress (Laurence 1993).

Data on the 24-month attrition rate of 1988–93 recruits presented in table 19 show that those without a traditional diploma who completed just one semester of college had attrition rates similar to those of Tier 2, rather than Tier 1, recruits. Although this category seems to be out of synch with others in the classification scheme, the various credentials and experiences currently remain in the tiers to which they were assigned in the late 1980s.

Because of continued political debate over the fairness of the three-tier credential system, the services began considering adaptability screening and an "Assessment of Background and Life Experiences" (ABLE) program to supplement or replace the current classification based on education credentials (Trent and Laurence 1993). These programs would use inventories of biographical and temperament information for selecting men and women for military service. Interest in implementing these types of screening mechanisms has abated, however, because of concerns that applicants could either fake or be coached into desirable responses. For the time being, in spite of its unpopularity among advocates of alternative education credentials, the three-tier system remains a fairly reliable and cost-effective means of screening new recruits.

Although the classification system places GED recipients in the second tier, many GEDs do enter the military. The 7–8 percent of GED recipients who enlist each year translates into 35,000–40,000 individuals.

Figure 3.—Educational classification system for military recruits
Tier 1: High School Graduate
High School Diploma (and higher)
Completed One Semester of College (not traditional diploma)
Tier 2: Alternative Credential Holder
Test-Based Equivalency Diploma (e.g., GED)
High School Certificate of Attendance
Adult Education Diploma
Correspondence School Diploma
Home Study Diploma
Tier 3: Nonhigh School Graduate
SOURCE: Laurence 1987, pp. iv, v.

CONCLUSION

Conclusion

As a rule, the GED process does not change people, it just identifies people with particular characteristics and certifies them as having those characteristics. Specifically, it identifies and certifies high school dropouts whose basic cognitive skills—the ability to read, write, think, and do math—are better than those of other dropouts and about equal to those of high school graduates, on average.

Like most other tests, the GED does not measure noncognitive characteristics that are related to performance in postsecondary education, the civilian labor market, and the military. The GED recipients typically have more schooling than other dropouts and (of course) less than high school graduates. They also tend to come from families with more socioeconomic status than those of dropouts but less than those of high school graduates. Characteristics such as these explain a substantial part of the differences in the performance of GEDs, dropouts, and high school graduates.

There are exceptions to the statement that the GED process does not change people. First, GED examinees typically invest about 30 hours, and a little money, in preparing for and taking the tests. This investment is very modest and, in itself, is unlikely to produce measurable gains in education and employment. However, about one-fourth of GED examinees in 1989 reported spending more than 100 hours preparing for the exam, a big increase over the percentage doing so in 1980. Second, by providing an initial step toward self-improvement, the GED builds self-confidence. The self-esteem of GED candidates increases as a result of passing the tests.

Thirty hours of preparation, or even 100 hours, is much less than the estimated 410 hours of instruction in core subjects that students receive in a typical high school year. In 1995, GED test takers had completed a mean 9.9 years of school. With 2.1 additional years of schooling, high school graduates had 861 more hours of core curriculum than GED examinees, on average.

For high school dropouts who attain the GED, the certification does provide reliable information about an individual's cognitive skills to postsecondary institutions, employers, the military, the federal government, and others who might be asked to make a selection decision about that person. Evidence from the National Adult Literacy Survey shows that GED recipients are equal to high school graduates in everyday thinking skills.

By signalling cognitive competencies to decision makers who usually know little about the individual in question, the GED can help open the door to opportunity. Once through the door, however, the individual has to use the cognitive skills and other personal resources not measured by the tests in order to succeed.

GED certification can help open the door to postsecondary education. Most colleges accept the credential, and multivariate studies show that GED recipients are more likely than comparable dropouts, though less likely than high school graduates, to attend. Under federal student financial aid policies, GED certification can also help recipients get financial assistance.

Once enrolled, how well do GEDs perform? Judging from the institutional studies we examined, their grade point averages are close to those of high school graduates. For example, in the 4-year colleges reviewed, the mean GPA of GED recipients in the first year was about a C, while that of high school graduates was a little under C+. In postsecondary vocational programs, GEDs got the same average grades as high school graduates. Moreover, in both the 2- and 4-year colleges and the vocational programs examined, the longer GED recipients stayed in, the more their grades converged with those of high school diploma holders. Upon graduation, the mean grades of the two groups were the same. Their tested cognitive skills no doubt play a significant role in the grades GEDs receive.

There is less parity in postsecondary persistence rates. GED recipients tend to have more attrition-related risk factors than high school graduates (e.g., delayed enrollment, part-time enrollment, single-parent status, and dependent children). While GEDs graduate from vocational programs at almost the same rate as high school diploma holders, they are only one-half as likely to earn associate's degrees and much less likely to earn bachelor's degrees. Relatively low rates of persistence tend to be a problem for GEDs who enroll in college.

In vocational education and training programs, GED recipients seem to be average students. Their grades, time-in-program, and graduation rates are about the same as those of high school graduates. The short-term, job-related nature of these programs and the hands-on learning they entail probably have an appeal for students who left high school early and want to take steps to find better jobs.

As with postsecondary education, GED certification can also help open the door to opportunity in the labor market. It increases full-time employment somewhat, probably by helping part-time workers find full-time jobs, though it seems to have little effect on unemployment. The great majority of employers accept the GED credential as a substitute for a diploma in hiring, and most say they regard it as equivalent to a diploma.

Once on the job, certification itself is of little help. Like other workers, GED recipients have to produce in order to succeed. In two small surveys, most employers said that GEDs performed as well as high school graduates on the job. Controlled studies showed that GED males earned more than other dropouts, but less than high school graduates, and GED females did at least as well as their male counterparts.

However, male GEDs tended to have more job turnover than dropouts, work the same amount of time per year, and have less work experience. Most GED females, on the other hand, have less job turnover than dropouts, spend more

time working per year, and have more work experience. High school graduates spent more time working and had less turnover than GEDs of either sex.

In some respects, the labor market performance of female GEDs is stronger than that of males. Relative to dropouts, female GEDs were less likely to be unemployed, spent more time working, had less job turnover, and had greater annual earnings than their male counterparts.

The hourly wages of GED recipients tend to be higher than those of dropouts but lower than those of high school graduates. Most of the GED's effect on wages comes not from the credential, but from the human capital that it represents. (This is also true of high school diplomas and college degrees, but one has to accumulate human capital by investing substantial time and meeting course requirements to earn them.) People who receive GEDs have more secondary schooling and better cognitive skills than other dropouts before they take the tests, and these factors, rather than GED certification, explain most of the wage differences between GEDs and dropouts.

Although GED certification has little direct effect on wages, once education level or ability are controlled, the credential does have indirect effects through further education and training. The GED increases access to postsecondary education and job training, and those who take advantage of this opportunity tend to receive additional gains in earnings.

Formerly, the GED credential also opened the door to opportunity in the military. Until the 1980s the services made no practical distinction between high school graduates and GED recipients. Then a series of research studies demonstrated that GED attrition rates were double those of high school graduates and about the same as those of dropouts. Over a period of time, the military developed a three-tier system for assessing the educational qualifications of applicants. High school graduates are placed in the first tier and are regarded as the best prospective recruits. GEDs are placed in the second tier, and dropouts in the third. Low rates of persistence have been the major problem for GEDs in the military.

All things considered, it's worthwhile for a high school dropout to get a GED. Its biggest advantage is that it increases access to postsecondary education and training, which in turn tend to increase earnings.

On the other hand, GED rates of persistence in the organized, structured activities examined in this study seem to be problematic, especially for males.[64] First evident in high school, the problem appears to recur in other contexts. In the military, GED attrition rates were close to those of dropouts. In postsecondary education, other than vocational programs, GED graduation rates were much lower than those of high school diploma holders. In labor market, male GEDs had more less work experience and more job turnover than dropouts. (The labor market outcomes are suggestive but difficult to interpret. To some extent, they may reflect the opportunity costs of acquiring more education and a tendency to leave old jobs for new ones with better pay.)

The GED measures and certifies cognitive skills, but not the range of other attributes that contribute to persistence. Based on studies of attrition in the military, researchers have concluded that completion of high school demonstrates such attributes and that a high school diploma reflects them. Other standardized tests such as the ASVAB and the SAT do not measure noncognitive attributes, either, but the combination of the tests and a high school diploma covers both the cognitive and the noncognitive dimensions.

Noncognitive skills, abilities, and attitudes come from many sources, especially the family and the school. The role of the school in developing them is widely recognized, but not well enough understood, and the subject would benefit from further inquiry. Involvement in the process of schooling (e.g., regular attendance, meeting deadlines, complying with authority, and cooperating with others) may affect later outcomes as much as learning the content of schooling.

Years of education and training, either preceding or following GED attainment, have much more impact on labor market outcomes than the credential itself. Hence, marginal students should be (and usually are) encouraged to finish high school, wherever possible. For those who do drop out, participation in alternative programs that have structure, rigor, and longevity may recoup some of the advantages lost by not finishing high school. Education policy makers should give more attention to developing innovative high school completion programs leading to a regular or adult diploma. Along other lines, awarding higher levels of GED certification for higher test scores, which educators in South Dakota are considering, may provide an incentive for dropouts to invest more time and energy in studying for the test. Those who pass the test should understand that GED certification is primarily a stepping stone and that additional progress in the labor market can best be made by completing postsecondary education and training programs. Specialized counseling should be considered to help GED recipients persist in their efforts to complete these programs.

In some respects, GED recipients resemble high school graduates (e.g., in basic cognitive skills and college grades); in others, they resemble dropouts (e.g., military attrition, job turnover). In hourly or yearly earnings, they fall between the two. Compared to the earnings of high school graduates, the GED glass appears half empty; compared to those of other dropouts, it appears half full. Given these mixed findings, the common practice of counting GEDs as high school graduates in educational statistics should be reconsidered.

Further, we should keep in mind that neither the high school diploma nor "some college" have been sufficient to enable young adults to maintain earnings over the years since the 1970s. It seems unlikely that, in the absence of other macroeconomic changes, education policy alone can reverse this trend.

NOTES

Notes

[1] For example, the headline for the June 2, 1997 *ACE News* reads "Record Numbers Complete GED Tests, Earn High School Diplomas; Most Plan Further Education" (American Council on Education 1997). Also see the announcement for *GED Profiles: Adults in Transition* (GED Testing Service n.d.). Another example at the local level is the fall 1997 continuing education course catalogue of the Anne Arundel Community College, which indicates that successful GED completers can earn their "Maryland State High School Diploma" (Anne Arundel Community College 1997). Many states have adopted policies designating GED certification as a high school diploma.

[2] For example, see Malizio and Whitney (1982), p. 10.

[3] In the years during and immediately after the war, there were two GED tests, a high school equivalency or "high school level" test and a more difficult advanced placement "college-level" test. The college test became the College-Level Examination Program (CLEP), currently administered by the College Board. The high school test became the GED that is used today and that is produced and administered by ACE's GED Testing Service.

[4] Early studies of GED outcomes in the late 1940s and early 1950s focused on the performance of veterans—all males—in postsecondary education. Later studies focused on civilians, both male and female, in college and in the labor market.

[5] Data provided by the National Center for Education Statistics (NCES). The increase is probably not due to immigration; growth was strongest in the midwest.

[6] Completions include tests completed the first time they are taken plus those completed by individuals retaking the GED. Obviously completions do not include tests administered but not completed in that year. In 1995, 829,904 tests were administered. Of those, 615,132 tests (74 percent of the total) were first-time completions; 108,767 (13 percent) were completions by individuals retaking the GED; and 106,005 (13 percent) were tests taken for the first time but not completed.

[7] Since not all examinees complete the GED, the percentage difference between these two years is not quite as large as it appears. When the denominator is all tests administered, as it was in 1958, the percentage of those retaking the test will be somewhat smaller than when the denominator is all tests completed, as it was in 1995.

[8] Kroll and Qi's rate is based on tests administered in the United States and the Territories, while table 1 reports on all GED tests, including those in Canada.

[9] The essay is the chief difference between the second and third versions of the test and the exception to the multiple-choice approach.

[10] Note that the early pass rates of veterans without high school diplomas (e.g., 92 percent) exceeded those of the high school seniors whose performance was used to norm the tests. The reasons for this difference are not clear but may be related to military experience.

[11] Probabilities have been calculated from data in Quinn 1997a and GED Testing Service 1993a. Quinn's (1997a) report provides the number of questions on each test and the number greater than chance required to meet the minimum passing score. It does not provide the number correct expected by chance or the required minimum number. The 1995 GED writing test includes an essay that does not involve multiple choice. Chance probabilities on this test cannot be computed from the data available.

[12] On the entire five-test battery, the lowest possible standard score is 100 points (20 points on each of five tests). The *Princeton Review* (Martz 1995) calculates that in 1995, guessing on every question would have added 47 standard points to 100, making up a little over one-third of the difference between the lowest possible score and the minimum required for passing.

[13] Seniors who do not graduate are excluded from the sample after the fact.

[14] Of course, both groups answered substantially more questions correctly than did the GED examinees who failed the regular test battery.

[15] Although percentages of correct answers and the means for the two groups are similar, the distributions are not, as Cameron and Heckman (1993a) have observed. The high school graduates' score distribution is approximately normal, while the GED recipients' distribution is truncated at the cut point for passing the test. The left tail of the distribution is lopped off, resulting in a concentration of GED recipients around the mean for all GED examinees. On another point, Quinn (1997a, 1997b) observes that, unlike high school seniors who take the tests, GED examinees can take the tests more than once and many are coached on the tests. However, the GED examinees in the Enger and Howerton study took the test only once, and many high school seniors are coached on other standardized tests such as the SAT.

[16] Quinn (1997a) notes that Lindquist's data from early years of the test show that the majority of Iowa students entering the ninth grade were passing each subtest at the passing norms established for veterans. Moreover, the 1977 Educational Testing Service norming study found that 73 percent of ninth-graders could pass all five of the GED tests under the GED standards at the time—35 or 45.

[17] For example, see Gary S. Becker's *Human Capital* (1964) and Jacob Mincer's *Schooling, Experience, and Earnings* (1974).

[18] According to a major evaluation of adult literacy programs (Development Associates 1994), participants in English-as-a-Second Language (ESL) programs received a median 113 hours of instruction, compared to 35 hours for those in Adult Basic Education (ABE) and 28 hours in Adult Secondary Education (ASE). Moreover, many immigrants take some combination of ESL, ABE, and ASE classes before taking the GED test. In general, the role of the GED in the acculturation of immigrants is an important subject on which little systematic research has been conducted.

[19] This rough estimate is derived from Cheryl M. Kane, *Prisoners of Time* (1994), the report of the National Education Commission on Time and Learning. The commission found that American students spend an average of 1,000 hours per year in school and an estimated 41 percent of this time was spent on core academic subjects. Elsewhere the commission estimated that the amount of time *required* by states to be spent on core subjects was 1,460 over 4 years, or an average of 365 per year.

[20] Note that the data on preparation time apply to GED examinees; no comparable data on GED recipients are available.

[21] There are some incentives to do well on the test, rather than merely passing it. Many colleges include GED scores among the factors they consider in admissions, and some states base scholarships in part on GED scores. Examinees wanting to enroll in these institutions or to win the scholarships do have incentives to do well on the tests.

[22] The Armed Forces Qualifying Test (AFQT) is a subset of the Armed Services Vocational Aptitude Battery (ASVAB).

[23] The GED data in this comparison reflect the mean NALS scores of the GED recipients in Baldwin's 1993 sample of GED test takers. A substantial number of these recipients, we can safely assume, later went on to college (Baldwin et al. 1995, p. 20). The NALS scores of all high school graduates are weighted averages for those with high school diplomas and above (Kirsch et al. 1992, pp. 119–121). The NALS scores for adults are weighted averages for all NALS examinees. These adults include GED recipients, but removing GEDs with no further education from the calculations results in minimal changes to the estimates. The data did not enable us to remove GEDs who received additional education, but their impact on the estimates for all adults is probably small or negligible. There may be a slight upward bias in the scores of the GED test takers, but we cannot tell from these data. Only GED examinees who completed the five-test battery at one sitting were included in the survey. It is possible that non-completers, who might have retaken and passed the test later, would have had lower scores than those who passed the first time.

[24] Though the comparison with high school graduates in table 8 seems to contradict the first part of table 7, it does not. In table 8, many of the GEDs will go to college, but the high school graduates have no college experience, by definition.

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The GED examinees have not yet had a chance to go to college. The high school graduates have had a chance to go to college but have not done so.

[25] Of course, the GEDs and high school graduates scored better on these tests than did high school dropouts (not shown in table 8).

[26] Maloney's method of comparing each group with the whole sample yields smaller differences than one would find by comparing each group with the other.

[27] To make this estimate, we calculated the weighted percentage of GED test takers who passed the test in the years 1981–86 inclusive, using the data in table 1. The result was 72.9 percent. We also used data from Kolstad and Kaufman (1989), who estimated that 30.7 percent of the dropouts in the High School and Beyond sophomore cohort obtained a GED between 1980 and 1986. This is very close to the estimate by Murnane, Willett, and Boudette (1994). Using NLSY data from the period 1979–91, they concluded that one-third of the dropouts in their cohort obtained a GED. If GED recipients equal 30.7 percent of dropouts and 72.9 percent of test takers, then test takers equal .307/.729 of dropouts, or 42.1 percent.

[28] This estimate is in Baldwin's August 8, 1997 comments on the draft of this study. Obviously an adult dropout chosen at random is much less likely to have taken the test than a younger person without a diploma. One reason is that test administration was not widespread when many adults who are now older were in their teens and twenties.

[29] Correspondence from Janet Baldwin, director of research, GED Testing Service. April 15, 1997.

[30] A small percentage of postsecondary institutions accept nonhigh school graduates who do not have GED degrees. Many of these have other alternative credentials, such as adult high school diplomas or acceptable CLEP scores.

[31] Class rank is one criterion for admission that 4-year colleges frequently use. The GED testing service has attempted to convert GED scores into class-rank equivalents.

[32] Outside the United States, a survey of 15 postsecondary institutions conducted by the Department of Continuing Education in Saskatchewan found that 13 accepted the GED certificate. In 6 of the 13, the GED alone was sufficient for admission. (Jantzen and Quigley 1982).

[33] Cited in Carson (1986).

[34] Here and elsewhere in this paragraph, item nonresponse accounts for the difference between the percentages presented and 100 percent.

[35] Murnane et al. also found that for females, GED attainment was associated with a slight increase in the probability of receiving company training and more substantial increases (6–13 percent) in the probability of receiving noncompany

training (often in government-sponsored training programs). GED attainment was also associated with increased male participation in noncompany training, but not in company training.

[36] Unpublished data available on the Internet (http://www.ed.gov/NCES/pubs/r94/r9412t23.html).

[37] The "other outcomes" in table 12 include 5 percent of high school graduates and 10 percent of GED recipients who enter the military in Cameron and Heckman's study. It also includes participants in adult basic education and GED classes in Behal's study.

[38] Altogether, the proportions receiving education and training across the categories in Cameron's study total 72 percent, but only 51 percent of the GED women in this study had either some college or some training after passing the tests.

[39] The Cameron/Heckman data in table 12 reflect the first educational decisions after attainment of the GED. The Cameron/Heckman data in table 11 reflect all educational decisions after attainment of the GED.

[40] Data are from U.S. Department of Education (1996a), table 10 and U.S. Department of Education (1995b), table 165.

[41] Three technical points bear on the following analysis: (1) College grades are not standardized the way tests are, but within the last several decades most colleges have adopted a four-point scale: A=4, B=3, C=2, D=1, and F=0. Grades based on other metrics can often be converted to this scale; we have done so wherever possible. (2) The studies of grade point averages examined here are based on student records, and the treatment of course withdrawals in calculating grade point averages varies somewhat across institutions. As a rule, students may withdraw from a course for any reason without GPA penalty until fairly late (e.g., within the last two weeks or a month of the course's conclusion) and their performance in the course is not counted in their GPA. However, late withdrawal is usually treated the same as a failing grade and is counted as a zero. (3) For studies of institutions that use a four-point grading system (or one that can be converted to it) and that conform to the treatment of withdrawals described above, it is possible to provide summary statistics for comparative purposes by averaging GPAs.

[42] Some of the studies reviewed aggregated statistics for more than one college. The data have been weighted to reflect the number of colleges in the studies.

[43] Along the same lines, a study by Keller (1958) shows that GEDs and high school diploma holders who graduated from East Tennessee State had about the same average grades across four subjects: American history, American literature, composition and rhetoric, and mathematics. The mean grade for GEDs was 2.53, that for high school graduates, 2.49.

[44] The Army is a good example. People who enlist in the Army have a variety of goals in mind. Some may want to leave after their goals have been met but before their term of service has been completed. Their early departure is counted as attrition, regardless of their individual goals or reasons for leaving.

[45] It is reasonable to assume that most students who enroll in certificate-granting one-year vocational programs intend to complete the programs. The same is probably true of most students who initially enroll in degree-granting programs in 4-year colleges.

[46] The current problem may not be quite as serious as these data indicate. If the Current Price Index (CPI) overstates inflation, as many economists believe, the earnings declines would be less marked than they appear. Moreover, the current full-employment labor market may bid up wages. Nevertheless, the long-term declines are probably real and a matter of concern.

[47] They also reflect the wages at which employees are willing to work.

[48] Averaging the data for time worked shows that male dropouts worked 0.73 percent more time (hours, weeks) per year than male GEDs in simple comparisons and 3 percent more in controlled comparisons. In effect, they work the same number of hours. At ages 25 and 28, male dropouts had 15.1 percent and 21.5 percent more work experience than GED males. Male dropouts at these ages spent 28.2 percent and 42.2 percent more time working on the current job than comparable GED males. The finding that male dropouts work about the same amount of time per year as GEDs is consistent with the finding of Murnane et al. (1995) that the GED did not have a significant impact on the number of hours worked per year.

[49] Maloney (1993), p. 27.

[50] This study used repeated cross-sectional analyses to show the earnings effects of the GED over time. It did not directly compare the earnings of GEDs (and of controls) before and after the GEDs attained their credential in 1990. Rather, it examined differences in the earnings of GEDs and controls in each of the 2 years before and 5 years after 1990. These cross-sectional comparisons provided a longitudinal assessment of earnings effects.

[51] They find dropouts with 10 years of schooling earn significantly more (10 percent) than dropouts with only 9 years. Similarly dropouts with 11 years earn 18 percent more than dropouts with only 9 years. There is a similar pattern for GED recipients, although two of the four coefficients are statistically insignificant. See Cameron and Heckman (1993), table 14.

[52] Interpretation of the ASVAB effect is clouded by the fact that the variables for marital status and children were added at the same time as the ASVAB variable.

[53] To use ASVAB in this way, attainment of the ASVAB scores had to follow GED certification and high school graduation. However, the ASVAB tests were

administered to NLSY participants of different ages (15–23) at different stages of their education in 1980. Maloney therefore "updated" the ASVAB scores of the respondents to the time of the followup survey, using multivariate techniques to predict what an individual's score would be in 1987. He then used the updated ASVAB score as the mediating variable in estimating indirect effects of the GED and the high school diploma. Dropouts were the omitted category.

[54] Here the negative signs indicate wages lower than those of high school graduates.

[55] Not in table B–7 because the coefficients were not reported.

[56] Note that this specification assumes that the return to additional tenure and experience is the same for all three groups. Below we review the evidence from Murnane et al. (1995) that finds that the return to tenure increases for GED recipients after they receive certification.

[57] The age dummies captured the increase in earnings with age across the three groups. The year variable (1979 or 1980) captured general economic conditions in that year.

[58] One limitation of this approach is that the wages of some individuals are represented only after receipt of the GED, because they obtained it early in the sample period, or only before receiving the GED, because they obtained in late in the period.

[59] Richard Murnane and John Willett collaborated in both of these studies.

[60] The surveys have typically been conducted by mail, and the response rates have usually been low—between 20 percent and 40 percent. Some of the reports have included nonresponse analyses examining differences between respondents and nonrespondents in demographic and other characteristics. The subjective nature of the respondents' perceptions and judgments about whether they had benefitted occupationally from the GED is another limitation of this approach.

[61] Estimates by Janice Laurence of the Human Resources Research Organization and Ed Schmitz of Navy Recruiting using GED and Bureau of Labor Statistics data.

[62] In these studies, the category high school graduate also includes individuals who have some college in addition to a regular high school diploma.

[63] Although AFQT scores may not be a useful tool for reducing attrition, a study by Lyle (1988) showed that GED scores and certain ASVAB subscores (auto and shop knowledge, mathematics knowledge, mechanical comprehension, electronic information) are negatively correlated with attrition. Among 3,979 army enlistees in the 1984 fiscal year holding GED certificates at the time of entry, the attrition group had significantly lower average GED scores than the nonattrition

group (264.16 compare to 267.24). Although the difference in average GED scores was small (less than a 10th of a standard deviation), the author recommended that GED scores rather than the certificate alone become an integral part of the screening process of recruits for service in the Army.

[64] Persistence, as used throughout the study, is an individual and organizational outcome, not a personal characteristic. It is partly a function of personal characteristics—such as perseverance, work ethic, and adaptability—that enable one to work well within an organization. It is also a function of factors, such as low income, single parent status, and having dependent children, that may adversely affect participation in an organization.

[65] Quinn (1997b) cites a report of student resentment at being pulled from regular classes in a Wisconsin school during the two days of GED testing (p. 44). The quotation is from the same source and page.

[66] Among other things, the survey sample was self-selecting, because it was drawn only from GED Test takers who agreed at the time of the test to participate in the planned survey. The survey response rate was only 24 percent. Nonresponse analysis showed that respondents were older, had higher GED test scores, had slightly less postsecondary education, and were more likely to be female than nonrespondents. The author concluded that both groups represented a single population but urged caution in generalizing from the data.

[67] Two different calculations in the study estimated the "employed" rate at 59 percent and 61 percent.

[68] As in Cervero and Peterson, the survey sample was drawn only from GED Test takers who agreed at the time of the test to participate in the future survey. Even so, the response rate was low (22 percent).

[69] Behal's 1982 follow-up survey of GED examinees has no comparative data on labor market outcomes, but it does have data on employment status and occupation of respondents at the time of the survey. Despite a low response rate (35 percent), Behal's estimate of the GED examinees' unemployment rate (24 percent) is similar to Cervero and Peterson's (21 percent) and Kroll and Qi's (also 21 percent).

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Appendix A. The GED Norming: Evidence From Wisconsin

Appendix A. The GED Norming: Evidence From Wisconsin

After setting rigorous new standards for passing the GED test (40 and 50), the Wisconsin Department of Public Instruction contracted with the GED Testing Service for a 1987 state norming of the test and collaborated in the process. According to Quinn (1997b), the Wisconsin case provides evidence of problems inherent in the GED norming process. While 77 percent of the schools asked to participate in the norming did so, only 38 percent of the seniors who started the five-test battery finished. The state Department of Public Instruction questioned the representativeness of the seniors in the study, particularly on the urban/rural dimension (Martin 1992). The GED Testing Service also said that the 1987 Wisconsin sample may have been biased (GED Testing Service 1993b).

Subsequently, a 1993 norming was conducted in Wisconsin to replicate the 1987 study with a more representative sample. According to Quinn, 46 percent of the schools contacted actually participated, and 81 percent of the students who started the test battery finished it. An analysis of the 1993 data showed that the participating schools were representative of the population of Wisconsin schools with regard to urbanicity, and the examinees were representative of Wisconsin seniors with regard to sex and race (GED Testing Service 1993b).

Student reluctance to take the test may have contributed to the participation problems. Quinn (1997b) provides anecdotal evidence of student unhappiness about taking the GED battery in the 1993 administration of the test, and ACE excluded from its calculations students who scored below the level expected by chance "to remove the deleterious effects resulting from students who may not have taken the examination seriously."[63]

APPENDIX B. TABLES

APPENDIX B. TABLES

Table B–1.—Correlations between the GED and other tests in local areas

Study	Test and location	Correlation
Brant 1975 citing Morgan 1969	Iowa Test of Educational Development Minneapolis, MN	.88
Smith and Goetz 1988	American College Test (ACT) North Harris County, TX	.80
Cervero 1981	Adult Performance Level (APL) Survey Cook County, IL	.81
Sonnenblick 1980	Degrees of Reading Power (DRP) Staten Island and Queens, NY	.77
Farr et al. 1986	Test of Adult Basic Education (TABE) Cheyenne, WY	.68
Littlefield and Dowling 1980	Test of Adult Basic Education (TABE) Chillicothe, OH	.66

SOURCE: Studies in this table.

Table B–2.—Correlations between GED composite and GATB general (G) scores in local areas in four states

Study and state	n	Correlation
Brenna 1969 , Wisconsin	40	.64
Klein and Trione 1970, Nevada	92	.67
Covington et al. 1978, Arizona	70	67
Covington et al. 1978, Minnesota	186	.61

NOTE: The General Aptitude Test Battery (GATB) was designed to measure the work-related skills of applicants for white-collar civil service jobs in the U.S. government. It consists of nine tests of aptitude, including general ability, verbal aptitude, numerical aptitude, and other occupationally related aptitudes such as clerical perception and manual dexterity. Of the nine, general ability and verbal aptitude are the most closely related to the GED.

SOURCE: Studies in this table.

Table B–3.—Standard scores on four ASVAB factors

Test factor, by gender	Attended college			Did not attend college		
	HSG, direct entry	HSG, delayed entry	GED	HSG only	GED	Dropout
Males						
Math reasoning	1.05	.55	.19	-.02	-.28	-.65
Verbal ability	.72	.44	.34	-.02	-.18	-.80
Processing speed	.51	.23	-.06	-.14	-.40	-.83
Mechanical knowledge	.97	.92	.68	.55	.36	-.13
Females						
Math reasoning	.75	.14	-.12	-.19	-.36	-.69
Verbal ability	.71	.45	.29	.12	-.03	-.72
Processing speed	.67	.49	.21	.28	-.08	-.53
Mechanical knowledge	.09	-.12	-.19	-.33	-.39	-.71

NOTE: The numbers in the table are standard deviations above and below the mean for the test.

SOURCE: Garet et al. (1996), exhibits 3, 4.

Table B–4.—Grade point averages of GED recipients and high school graduates

Postsecondary Vocational Programs

Author	College/program Students/year	Population or sample	Number	GPA	See ftns.	Ratio GED/HSG
Enrollees						
Wilson, Davis, and Davis 1981	Lake City Community College, Florida. Enrollees in 5 vocational programs 1976–77	Sample of voc. enrollees	27 GED 77 HSG Age adjusted: GED HSG	2.80 2.56 2.67 2.60	* ns	1.09
Shepherd 1992	12 of 58 NC Community Colleges. Vocational-tech entrants, Fall 1987. At least 12 credit hours 4 years later	All students 3,429 Vocational 798 Technical 2,631	260 GEDs 3,169 HSGs 71 GEDs 727 HSGs 189 GEDs 2,442 HSGs	2.59 2.85 2.37 2.91 2.81 2.79	rn	0.91
Parrish 1994	2-yr colls, AL 4 randomly selected LPN programs out of 10	All full-time fall enrollees 88–90 in the 4 programs	114 GEDs 414 HSGs	2.51 2.32	rn	1.08
Mean GPA GED				*2.58*		
Mean GPA HSG				*2.71*		
Mean Ratio GED/HSG				*0.95*		
Number of Colleges				*17*		
Graduates						
Welch 1980	U. Tenn. - Nashville 1972 entrants in 2-yr AS Nursing programs Graduated by Spring 1978	All 492 graduates	42 GEDs 211 HSGs 244 Transfers	2.73 2.77 2.79	rn	0.99
Swift 1989	12 of 28 postsecondary vocational schools, GA Enrollees in 1 year Nursing program, 1983–86	All 1,254 nursing graduates	282 GEDs 972 HSGs	3.19 3.09	ns	1.03
Ziegler 1992	3 Ohio tech. colls. 5 Tech major areas Grades in (required) social science and communications courses	All AS grads 1978–85	111 GEDs 357 HSGs	3.02 3.08	rn	0.98
Parrish 1994	2-yr colls, AL 4 randomly selected LPN programs out of 10	All full-time fall enrollees 88-90 in the 4 programs	114 GEDs 414 HSGs	2.94 2.98	rn	0.99
Mean GPA GED				*3.09*		
Mean GPA HSG				*3.05*		
Ratio: MeanGED/MeanHSG				*1.01*		
Number of Colleges				*20*		

Table B–4.—Grade point averages of GED recipients and high school graduates (continued)

Postsecondary Vocational Programs (continued)

Author	College/program Students/year	Population or sample	Number	GPA	See ftns.	Ratio GED/HSG
Other (ftn)						
Kothenbeutel 1993	Kirkwook Community College, Iowa 5 technical programs. Enrolled Fall 1985. Data as of Spring 1990	410 remedial test takers. Limited population	56 GEDs 354 HSGs	1.94 2.59	rc	0.75
Ratio: GED/HSG				*0.75*		

ftn. Study focused on restricted population.
* = HSG significantly greater than GED p<.05
^ = GED significantly greater than HSG p<.05
ns = No signifcant difference
rn = Real numbers (not estimates)
rc = Our recalcuation

2-year colleges

Author	College/program Students/year	Population or sample	Number	GPA	See ftns.	Ratio GED/HSG
First Year						
Hannah 1972	3 Junior Colleges, Alabama All enrollees 1965–71 (1st year GPAs)	All GEDs Random HSGs	300 GEDs 300 HSGs	1.87 2.07	ns	0.90
Moore 1973	5 community/junior colleges in Texas. Full-time Entrants, Fall 1971	All GEDs Random HSGs	220 GED 220 HSG	1.61 2.31	*	0.70
Ayers 1978	Surry Community College, NC Enrollees 1977–78. After 1 year	All GEDs Random HSGs	37 GEDs 37 HSGs	2.75 2.93	ns	0.94
Wilson 1977	Tulsa Junior College Oklahoma. Entrants, 1st semester 1981	All GEDs All HSGs	187 GEDs 2322 HSGs	1.92 2.16	rn	0.89
Scales 1990	3 Alabama 2-year colleges. Entrants Fall 1987. Full time, 1st quarter only	All GEDs Random HSGs	47 GEDs 45 HSGs	1.88 2.02	ns	0.93
Schillo 1990	Lorain Co. Community College, Ohio Entrants, Fall 1988–89 Data for school year	All GEDs Random HSGs	40 GEDs 40 HSGs	1.95 2.66	*	0.73
Mean GPA GEDs				*1.85*		
Mean GPA HSGs				*2.26*		
Ratio: MeanGED/MeanHSG				*0.82*		
Number of Colleges				*14*		

Table B–4.—Grade point averages of GED recipients and high school graduates (continued)

2-year colleges (continued)

Author	College/program Students/year	Population or sample	Number	GPA	See ftns.	Ratio GED/HSG
All Years						
Hartung 1948	U. of Tennessee Junior College	All GEDs ? others	53 GEDs Other vets Non-vets Women Non-GED Av.	1.37 2.13 2.01 2.29 2.14		0.64
Hannah 1972 (2nd yr. GPAs)	3 Jr. Colleges, Alabama Enrollees 1965–71	All GEDs Random HSGs	120 GEDs 158 HSGs	2.66 2.11	^	1.26
Wolf 1980	South Plains College, Texas. Enrollees Fall 1970–Fall 1973	"Representative sample"	100 GED 100 HSG 100 non-HSG	2.61 2.64 2.60	ns	0.99
Spillar 1982	(Community) College of the Mainland, Texas Entrants Fall 1978 3 years later	All GEDs Random HSGs	105 GED 105 HSG	2.71 2.50	ns	1.08
Willett 1982	Elgin Community Coll., Illinois. Entrants 1976 5 years later	Random GEDs Random HSGs	68 GEDs 68 HSGs	2.33 2.44	ns	0.95
Grady 1983	Broward Community College, FL. Entrants Fall 80. >1 course 3 years later	All GEDs Random HSGs Match age, sex, race	458 GEDs 458 HSGs	2.46 2.58	ns	0.95
Klein and Grise 1987	Survey of registrars at 10 of 28 Florida community colleges		GEDs HSGs	2.54 2.75	*	0.92
McElroy 1990	Kankakee Community College, Illinois Enrollees in FY 1990	Random GEDs Random HSGs	50 GEDs 50 HSGs	2.93 2.76	^	1.06
Mean GPA GEDs				*2.52*		
Mean GPA HSGs				*2.57*		
Ratio: MeanGED/MeanHSG				*0.98*		
Number of Colleges				*19*		

Table B–4.—Grade point averages of GED recipients and high school graduates (continued)

2-year colleges (continued)

Author	College/program Students/year	Population or sample	Number	GPA	See ftns.	Ratio GED/HSG
Graduates						
Clark 1987	Community College of Allegheny Co., PA Graduates 1/1985–8/1986	All GEDs Random HSGs	56 GEDs 56 HSGs	3.21 3.03	ns	
Ratio GED/HSG				1.06		
Number of Colleges				1		
Other (ftn.)						
Tiner 1995	Ark. St. U.-Beebe (2-yr.) "Volunteers" with at least 12 hrs About 1994	Sample of 276 students. Self-selecting sample.	54 GED 222 HSG	3.28 2.72	^	1.21
Ratio GED/HSG				1.21		

ftn. Study has methodological problems that raise questions about the reliability/validity of the findings.

* = HSG significantly greater than GED p<.05
^ = GED significantly greater than HSG p<.05
ns = No signifcant difference
rn = Real numbers (not estimates)
rc = Our recalculation

4-year colleges

Author	College/program Students/year	Population or sample	Number	GPA	See ftns.	Ratio GED/HSG
First Year						
Putnam 1947	Vanport Extension Center, Oregon State System. Enrollees, Winter quarter 1947	All GEDs All HSGs	71 GEDs 1129 HSGs	2.42 2.39	rn	1.01
Stinson 1947 in Whitley 1958	Colorado A&M		30 GEDs — HSGs	1.94 2.36		0.82
Dixon 1948	University of Missouri Enrolled 1st semester 1947. Took ACE psych. examination	All GEDs Sample HSGs Match vet sex age marital college term aptitude entrance	257 GEDs 257 HSGs	1.93 2.10		0.92
Roeber 1950	Kansas State Teachers' College Completed at least 1 semester. 1st semester GPAs	All GEDs All ? HSGs	71 GED 397 HSG	2.00 2.33	rc adj	0.86

Table B–4.—Grade point averages of GED recipients and high school graduates (continued)

4-year colleges (continued)

Author	College/program Students/year	Population or sample	Number	GPA	See ftns.	Ratio GED/HSG
First Year (continued)						
Adams 1950	Southwest Texas	GED vets	GEDs	1.79		0.74
in Whitley 1958	State Teachers College	HSGs	HSGs	2.42		
Milligan, Lins.	U. of Wisconsin	All GEDs (1 female)	72 GEDs	1.60	rn	0.75
& Little 1948	Entrants in first year	All male students	All males	2.13	rc	
Colert 1983	Brandon University Canada. Entrants 1982–83. 1st year GPAs	All GEDs Systematic sample HSGs	26 GEDs 27 HSGs	1.68 1.98	ns	0.85
Means 1987	Casper College	All GEDs	GEDs	2.31	rn	0.99
in Johnson 1992	WY. Entrants Fall 1986	All Freshmen	Freshmen	2.34		
Rogers 1987	U. of Arkansas, Fayetteville. Enrollees Fall 1982–Spring 1986 First yr. GPA	All GEDs Random HSGs	178 GEDs 207 HSGs	1.82 2.34	rc	0.78
Van de Ven 1985	University of Wisconsin-	All GEDs	28 GED	1.88	rn	0.85
in Quinn 1986	Green Bay. Entrants Fall 1981. 1st sem. GPA.	All HSGs	211 HSG	2.21	rc	
Quinn 1986	U. Wisconsin - Madison. Enrolled Fall 1979–80 through Fall 1984–85. 1st sem. GPA	All GED All HSG	51 GED 22655 HSG	2.35 2.76	rn	0.85
Mean GPA GED				*1.97*		
Mean GPA HSG				*2.31*		
Ratio: MeanGED/MeanHSG				*0.86*		
Number of Colleges				*11*		

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Table B–4.—Grade point averages of GED recipients and high school graduates (continued)

4-year colleges (continued)

Author	College/program Students/year	Population or sample	Number	GPA	See ftns.	Ratio GED/HSG
All Years						
Dixon 1948 (After 1st term)	Univ. of Missouri Entered 1st sem. 1947. Took ACE psych exam. Over 7 semesters.	All GEDs Sample HSGs Match vet sex age marital college term aptitude entrance	257 GEDs 257 HSGs	2.02 2.15		0.94
Andrew 1951	University of Utah. Male entrants Fall 1945–Summer 1950. Probably as of late 1950–early 1951. Completed at least one quarter.	All matchable GEDs. Sample HSGs. Matched on sex, age, college, quarter admitted, ability. Selection methods unclear.	209 GED 209 HSG	0.56 0.89	*	0.63
D'Amico 1957	Indiana University Males admitted 1946–50.	All GEDs Random HSGs	307 GED 307 HSG	2.85 3.16	*	0.90
Roon 1972	Metropolitan State College, Colorado. All those enrolled through 1971.	Random GEDs. Random HSGs, stratified by HS rank. 30/30/40	237 GEDs 660 HSGs	1.84 2.28	rc *	0.81
Quinn 1986	U. Wisconsin - Milwaukee Enrolled Fall 1979–80 through Fall 1984–85.	All GEDs All HSGs After 4 semesters	538 GEDs 12146 HSG	1.98 2.56	m rc	0.77
Rogers 1987	U. of Arkansas, Fayetteville Enrollees Fall 1982–Spring 1986.	All GEDs Random HSGs	442 GEDs 375 HSGs	2.12 2.36		0.90
Mean GPA GED				*1.90*		
Mean GPA HSG				*2.23*		
Ratio: MeanGED/MeanHSG				*0.85*		
Number of Colleges				*6*		

Table B–4.—Grade point averages of GED recipients and high school graduates (continued)

4-year colleges (continued)

Author	College/program Students/year	Population or sample	Number	GPA	See ftns.	Ratio GED/HSG
Graduates						
Whitley 1958	Florida State U. Entrants 1948–49 thru 1952–53. Graduates	All GEDs 15% systematic HSGs	31 GEDs 59 HSGs	2.37 2.48		0.96
Sultan 1989	Miss St. U & U of Southern Miss 1982–87 Graduates	All GEDs Sample HSG Match sex, majors, yr grd	37 GEDs 37 HSGs	3.13 3.04	ns	1.03
Mean GPA GED				*2.75*		
Mean GPA HSG				*2.76*		
Ratio: MeanGED/MeanHSG				*1.00*		
Number of Colleges				*3*		
Other						
Keller 1958	East Tennesee State College. Graduates. Average of grades in History, Literature, Composition and Rhetoric, and Math	Random GEDs HSGs	150 GEDs 150 HSGs	2.53 2.49		

* = HSG significantly greater than GED p<.05
^ = GED significantly greater than HSG p<.05
ns = No signifcant difference
rn = Real numbers (not estimates)
rc = Our recalculation

Table B–5.—Postsecondary graduation rates of GED recipients and high school graduates

Postsecondary Vocational Programs

Author	College, Program	Population Sample	Number	Percent Graduating	GED/HSG Ratio
Tyler 1956	Institute Applied Arts & Sciences, Buffalo Entrants 1947–52.	All GEDs All HSGs	58 GED 2,154 HSG	62.0 72.0	0.86
Murphy 1973 in Rogers 1987		LPN students 1960–1972	46 GEDs 40 HSGs	78.0 61.0	1.28
Wilson, Davis, & Davis 1981	Lake City Community College, FL Duration unclear. 5 voc programs.	Voc. enrollees 1976–77. Selection unclear	27 GEDs 77 HSGs	63.0 60.0	1.05
Pawasarat & Quinn 1986	Milwaukee Area Technical College. Entrants 1980–83; by 1985. 7 or more credits, 1st semester.	All GEDs All others	501 GED 3,300 HSG 827 HSDrops	38.0 59.0 31.0	0.64
Swift 1989	12 of 28 postsecondary vocational schools, GA 1983–86	All practical nursing studs Age, race?	282 GED 972 HSG 1,254 total	68.0 70.0	0.97
Carr 1994	Kentucky Tech Institutions 3 health programs	All leavers (376) random stayers (375) enrolled 1989–92	GED HSG	40.0 62.0	0.65
Parrish 1994	2-year colls, AL 4 randomly selected LPN programs out of 10	All full-time fall enrollees 1988–90 in the 4 programs	114 GEDs 414 HSGs	44.7 52.4	0.85
Mean GED				*56.2*	
Mean HSG				*62.3*	
Ratio: Mean GED/Mean HSG				*0.90*	
Number of colleges				*20*	

Table B–5.—Postsecondary graduation rates of GED recipients and high school graduates (continued)

2-year colleges

Author	College, Program	Population Sample	Number	Percent Graduating	GED/HSG Ratio
Willet 1982	Elgin Community College IL Entrants, in 1976, 5 years later.	Random Random	68 GEDs 68 HSGs	22.0 27.9	0.79
Grady 1983	Broward Community College, FL Entrants, Fall 1980. >1 course. 3 years later.	All GEDs Random HSGs Match age, sex, race.	458 GEDs 458 HSGs	3.5 7.2	0.49
Klein & Grise 1987	Survey of registrars at 10 of 28 Florida community colleges.	All GEDs All HSGs	GEDs HSGs	26.0 49.0	0.53
Pawasarat & Quinn 1986	Milwaukee Area Technical College. Entrants 1980–83; by 1985.	All GEDs All others 7 or more credits	1578 GEDs 9500 HSG 248 HSDrops	8.0 30.0 10.0	0.27
Mean GED				*14.9*	
Mean HSG				*28.5*	
Ratio: Mean GED/Mean HSG				*0.52*	
Number of colleges				*13*	

4-year colleges

Author	College, Program	Population Sample	Number	Percent Graduating	GED/HSG Ratio
Bledsoe 1953	University of Georgia	All GEDs All 1946 Freshmen	GED Full cohort.	27.0 34.0	0.79
Bledsoe 1953	Middle Tennessee State College. Freshmen in 1946;	All GEDs All 1946 Freshmen	GED Full cohort.	24.0 31.0	0.77
D'Amico 1957	Indiana University Males admitted 1946–1950 Complete 1+ courses	All GEDs Random HSG GED 35/45	307 GED 307 HSG	25.4 29.6	0.86
Whitley 1958	Florida State University Entrants 1948–9/1952–3	All 15 percent chosen systematically	89 GED 194 HSG	34.8 30.4	1.14
Mean GED				*27.8*	
Mean HSG				*31.3*	
Ratio: Mean GED/Mean HSG				*0.89*	
Number of colleges				*4*	

Table B–5.—Postsecondary graduation rates of GED recipients and high school graduates (continued)

4-year colleges (continued)

Author	College, Program	Population Sample	Number	Percent Graduating	GED/HSG Ratio
Other*					
Bledsoe 1953	University of Tennessee Freshmen 1946; 5 years later.	All GEDs All 1946 Freshmen Cohort rate informal estimate.	GED Full cohort	17.0 42.0	0.40
Tyler 1956	Champlain College, VT Period unknown.	Selection unknown	170 GED 78 HSG	14.0 11.0	1.27
Tyler 1956	Indiana University Period unknown.	Selection unknown	221 GED 221 HSG	34.0 39.0	0.87
Mean GED				*21.7*	
Mean HSG				*30.7*	
Ratio: Mean GED/Mean HSG				*0.71*	
Number of colleges				*3*	

* The "other" studies have methodological problems that raise questions about the validity/reliability of the findings.

Table B–6.—Labor market outcomes for GED recipients, high school graduates, and dropouts: Simple and controlled comparisons

Outcome/Author	Measure	Male/ Female	Difference (Percent)* Age or year	Dropout vs. GED	HSG vs. GED	Dropout Mean or Coeff	GED Mean or Coeff	Diploma Mean or Coeff	Exclusions/ Controls	Table or page
Labor Force Participation										
Simple Comparisons										
Passmore (1987)	% in labor force	M	1985	-4.6	8.4	71.7	76.3	84.7		table 1
Smith et al. (1995)	% in labor force	M	16 to 64 in '92	-3.1	3.6	86.2	89.3	92.9		table 31–3 & 31–5
Reder (1994)	% in labor force	M	16–64	-9.0	2.0	73.0	82.0	84.0		fig. 9
Smith et al. (1995)	% in labor force	F	16 to 64 in '92	-9.4	1.9	59.9	69.3	71.2		table 31–3 & 31–5
Reder (1994)	% in labor force	F	16–64	-8.0	17.0	44.0	52.0	69.0		fig. 9
Reder (1994)	% in labor force	Ad	16–64	-12.0	4.0	60.0	72.0	76.0		fig. 9
Controlled Comparisons										
Passmore (1984)	probability	M	1985	-3.6	9.8	cc	3.6	13.4	Controls: Race, sex, marital status, college attend., region	table 1
Reder (1994)	probability	M	16–64	ns	ns				Ftn. 1	
Reder (1994)	probability	F	16–64	ns	ns				Ftn. 1	
Sum (1996)	probability	Ad	16–64	-1.4	0.7	-2.1	-0.7	cc	Ftn. 2	appendix 7 B p. 241
Reder (1994)	probability	Ad	16–64	ns	ns				Ftn. 1	
Employment										
Simple Comparisons										
Passmore (1987)	% employed	M	20–27 in 1985	-8.4	13.6	55.9	64.3	77.9	Excl: In school 85	table 1
Alsalam et. al. (1993)	% employed	M	25–33 in 1990	3.0	11.0	86	83	94	Excl: Diploma or GED age 20 or after. Those with 2 or more years of college	table 34–1
Alsalam et. al. (1993)	% employed	M	25–33 in 1990	-1.0	4.0	86	87	91	Excl: Diploma or GED before age 20. Those with 2 or more years of college	table 34–1
Reder (1994)	% employed	M	16–64 in 1992	-14.0	6.0	62.0	76.0	82.0		fig. 10
Smith et. al. (1995)	% employed	M	16–64 in 1992	1.1	10.9	76	74	85	Diploma graduates exclude those with any college.	table 31–5

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Table B–6.—Labor market outcomes for GED recipients, high school graduates, and dropouts: Simple and controlled comparisons (continued)

Outcome/Author	Measure	Male/ Female	Difference (Percent)* Age or year	Dropout vs. GED	HSG vs. GED	Dropout Mean or Coeff	GED Mean or Coeff	Diploma Mean or Coeff	Exclusions/ Controls	Table or page
Employment										
Simple Comparisons (continued)										
Alsalam et. al (1993)	% employed	M	25–33 in 1990	0.7	8.5	86	85	94	Excludes those with more than 2 years of college, in military, self-employed, enrolled in college full-time, or having a health condition that would prevent them from working.	table 34–1
Maloney (1991a)	% employed	F	20–27 in 1985	-18.7	12.5	35.5	54.2	66.7		table 1
Alsalam et. al (1993)	% employed	F	25–33 in 1990	-17.0	7.0	52	69	76	Excl: Diploma or GED age 20 or after. Those with 2 or more years of college	table 34–1
Alsalam et. al (1993)	% employed	F	25–33 in 1990	-12.0	-1.0	52	64	63	Excl: Diploma or GED before age 20. Those with 2 or more years of college	table 34–1
Reder (1994)	% employed	F	16–64 in 1992	-11.0	18.0	37.0	48.0	66.0		fig. 11
Smith et. al (1995)	% employed	F	16–64 in 1992	-12.4	3.0	49	62	65	Diploma graduates exclude those with any college.	table 31–5
Alsalam et. al (1993)	% employed	F	25–33 in 1990	-14.3	9.2	52	66	75	Excludes those with more than 2 years of college, in military, self–employed, enrolled in college full–time, or having a health condition that would prevent them from working.	table 34–1
Reder (1994)	% employed	Ad	16–64 in 1992	-15.0	7.0	51.0	66.0	73.0		fig. 9
Reder (1994)	% employed full time	M	16–64 in 1992	-23.0	3.0	42.0	65.0	68.0		fig. 10
Reder (1994)	% employed full time	F	16–64 in 1992	0.0	22.0	18.0	18.0	40.0		fig. 11
Reder (1994)	% employed full time	Ad	16–64 in 1992	-18.0	4.0	31.0	49.0	53.0		fig. 9
Controlled Comparisons										
Passmore (1987)	% employed	M	1985	-5.3	15.4	cc	5.3	20.7	Ftn. 3	table 1
Sum (1996)	prob. employed	Ad	16-64	-0.9	4.4	-0.053	-0.044	cc	Ftn. 2	appendix 7B p. 241
Sum (1996)	prob. full time employ	Ad	16–64	-5.5	-0.8	-0.047	0.008	cc	Ftn. 2	appendix

Table B–6.—Labor market outcomes for GED recipients, high school graduates, and dropouts: Simple and controlled comparisons (continued)

Outcome/Author	Measure	Male/ Female	Difference (Percent)* Age or year	Dropout vs. GED	HSG vs. GED	Dropout Mean or Coeff	GED Mean or Coeff	Diploma Mean or Coeff	Exclusions/ Controls	Table or page
Unemployment										
Simple Comparisons										
Cameron and Heckman (1993)	%unemployed	M	25	-1.0	-5.0	6.0	7.0	2.0		table 5A
Cameron and Heckman (1993)	%unemployed	M	28	1.0	-2.0	5.0	4.0	2.0		table 5A
Smith et. al. (1995)	% of LF unemployed	M	16–64	-4.3	-8.5	12	17	8	Diploma graduates exclude those with any college.	table 31–3
Reder (1994)	% unemployed	M	16–64	5.0	-4.0	11.0	6.0	2.0		fig. 10
Maloney (1993)	% unemployed	F	23–31	-0.4	-7.9	37.9	38.3	30.4		table 1
Smith et. al. (1995)	% of LF unemployed	F	16–64	6.7	-1.8	18	11	9	Diploma graduates exclude those with any college.	table 31–3
Reder (1994)	% unemployed	F	16–64	3.0	-1.0	7.0	4.0	3.0		fig. 11
Reder (1994)	% unemployed	Ad	16–64	3.0	-3.0	9.0	6.0	3.0		fig. 9
Controlled Comparisons										
Sum (1996)	prob. unempl.	Ad	16-64	0.0	-4.7	0.047	0.047	cc	Ftn. 2	appendix 7B p. 241
Wages										
Simple Comparisons										
Passmore (1987)	hourly (1985 $)	M	1985	-6.7	15.6	5.13	5.50	6.36	Excl: In school 85	table 1
Alsalam and Conaty (1989)	hourly	M	1986	-6.4	2.5	5.98	6.39	6.55	All 1980 Sophomores	table 5
Cameron and Heckman (1993)	hourly (1988 $)	M	25	-6.7	16.2	6.84	7.33	8.52		table 5
Cameron and Heckman (1993)	hourly (1988 $)	M	28	-10.9	21.2	7.51	8.43	10.22		table 5
Smith et. al. (1995)	weekly 1992 $	M	16–65	-11.9	1.5	407	462	469	Diploma graduates exclude those with any college.	table 31–2
Reder (1994)	hourly (1992 $)	M	16–64	-19.3	8.9	7.87	9.75	10.62	Excl: Postsecondary degree	
Alsalam and Conaty (1989)	hourly	F	1986	-12.6	2.3	4.58	5.24	5.36		table 5
Cameron (1994)	hourly	F	25	-11.1	19.1	6.19	6.96	8.29		table 7
Cameron (1992)	hourly	F	28	-9.7	34.0	6.32	7.00	9.38		table 6B
Maloney (1993)	hourly	F	1988	-10.7	6.3	4.83	5.41	5.75		p. 14
Smith et. al. (1995)	weekly 1992 $	F	16–65	-1.7	12.6	281	286	322	Diploma graduates exclude those with any college.	table 31–2
Reder (1994)	hourly (1992 $)	F	16–64	-9.9	29.2	5.00	5.55	7.17	Excl: Postsecondary degree	

Table B–6.—Labor market outcomes for GED recipients, high school graduates, and dropouts: Simple and controlled comparisons (continued)

Outcome/Author	Measure	Male/ Female	Difference (Percent)* Age or year	Dropout vs. GED	HSG vs. GED	Dropout Mean or Coeff	GED Mean or Coeff	Diploma Mean or Coeff	Exclusions/ Controls	Table or page
Wages										
Simple Comparisons (continued)										
Sum (1996)	weekly '92 $	Ad	16–65	-13.5	-0.2	373	431	430	Excl: Not employed full-time and some postsecondary education	table 4.3, p. 117
Controlled Comparisons										
Passmore (1987)	hourly ('85$)	M	1985	-7.1	19.3	cc	0.39	1.45	Excl: Enrolled in school in 1985. Controls: Race, ever married, ever attended college, and region of residence. Ftn. 3	table 1
Cameron and Heckman (1993)	log hourly	M	25	-5.8	8.8	cc	0.06	0.14	Excl: Enrolled in college and persons not working	table 6, 9.
Cameron and Heckman (1993)	log hourly	M	28	-6.0	11.9	cc	0.06	0.17	Excl: Enrolled in college and persons not working	table 9
Garet, Jing, & Kutner (1996)	log hourly	M	28	-9.5	8.3	cc	0.10	0.18	Excl: Those with more two or more years of college. Controls: Race/ethnicity, weeks worked unemployment rate. Ftn. 4	table 17A
Sum (1996)	log weekly	M	16–65 in 1992	-11.6	12.2	-0.238	-0.122	cc	Full-time employed adults, prose literacy	appendix 7B p. 250
Reder (1994)	log hourly	M	16–65 in Oregon in 1992	-10.4	12.7				A measure of functional literacy, level of parent's education, literacy material available in the home, years in occupation, age, and squared age, Reder's coding of the contrasts do not fit the format of this table.	table 10
Cameron (1994)	log hourly	F	28	-7.8	16.2	cc	0.08	0.23	Exclu: >12 yrs. education	table 8
Garet, Jing, & Kutner (1996)	log hourly	F	28	2.4	4.5	cc	-0.02	0.02	Excl: Those with more two or more years of college. Controls: Race/ethnicity, weeks worked, unemployment rate. Ftn. 4	table 17A
Sum (1996)	log weekly	F	16–65 in 1992	-12.9	2.2	-0.2	-0.022	cc	Full-time employed adults, prose literacy	appendix 7Bp. 250

Table B–6.—Labor market outcomes for GED recipients, high school graduates, and dropouts: Simple and controlled comparisons (continued)

Outcome/Author	Measure	Male/ Female	Difference (Percent)* Age or year	Dropout vs. GED	HSG vs. GED	Dropout Mean or Coeff	GED Mean or Coeff	Diploma Mean or Coeff	Exclusions/ Controls	Table or page
Wages										
Controlled Comparisons (continued)										
Reder (1994)	log hourly	F	16–65 in Oregon in '92	-10.5	28.6				A measure of functional literacy, level of parent's education, literacy material available in the home years in occupation, age, and squared age. Reder's coding of the contrasts do not fit the format of this table.	table 11
Sum (1996)	log weekly	Ad		-5.1	8.9	-0.140	-0.089	cc	Controls: Prose proficiency	appendix 7B p. 251
Sum (1996)	log weekly	Ad		-9.3	6.6	-0.159	-0.066	cc	Controls: Composite proficiency	appendix 7B p. 252
Reder (1994)	log hourly	Ad		-10.7	17.5				A measure of functional literacy, level of parent's education, literacy material available in the home, years in occupation, age, and squared age. Reder's coding of the contrasts do not fit the format of this table.	table 9
Time Worked										
Simple Comparisons										
Cameron and Heckman (1993)	annual hours	M	25	0.5	9.6	1,747	1,738	1,906		table 5
Cameron and Heckman (1993)	annual hours	M	28	6.8	21.2	1,836	1,720	2,084		table 5
Alsalam et. al (1993)	weeks worked	M	25–33 in 1990	5.1	17.9	41	39	46	Excl: Diploma or GED age 20 or after and those with 2 or more years of college.	table 34–1
Alsalam et. al (1993)	weeks worked	M	25–33 in 1990	13.9	33.3	41	36	48	Excl: Diploma or GED before age 20 and those with 2 or more years of college.	table 34–1
Smith et. al. (1995)	weeks worked	M	16-64	-1.0	2.1	48	48	49	Diploma graduates exclude those with any college.	table 31–4
Reder (1994)	weeks worked	M	16-64	-20.9	2.3	34	43	44	Excl: Any college	
Maloney (1993)	annual hours	F	23–31 in 1988	-31.0	39.2	613	888	1,237		
Cameron (1994)	weeks worked	F	25	-37.5	21.4	18	29	35	Excl: Any college	table 7, panel B

Table B–6.—Labor market outcomes for GED recipients, high school graduates, and dropouts: Simple and controlled comparisons (continued)

Outcome/Author	Measure	Male/ Female	Difference (Percent)* Age or year	Dropout vs. GED	HSG vs. GED	Dropout Mean or Coeff	GED Mean or Coeff	Diploma Mean or Coeff	Exclusions/ Controls	Table or page
Time Worked										
Simple Comparisons (continued)										
Alsalam et. al (1993)	weeks worked	F	25–33 in 1990	-23.3	-3.3	23	30	29	Excl: Diploma or GED age 20 or after and those with 2 or more years of college.	table 34–1
Alsalam et. al (1993)	weeks worked	F	25–33 in 1990	-34.3	5.7	23	35	37	Excl: Diploma or GED before age 20 and those with 2 or more years of college.	table 34–1
Smith et. al. (1995)	weeks worked	F	16-64	-3.2	1.7	46	47	48	Diploma graduates exclude those with any college.	table 31–4
Reder (1994)	weeks worked	F	16-64	6.9	37.9	31	29	40	Excl: Any college	
Cameron (1992)	hrs. per week	F	25	-1.1	1.3	37.5	37.9	38.4		table 6A
Cameron (1992)	hrs. per week	F	28	-5.8	-4.3	37.2	39.5	37.8		table 6B
Cameron (1992)	hrs. per week	F	30	-2.6	-2.3	37.4	38.4	37.5		
Controlled Comparisons										
Cameron and Heckman (1993)	annual hours (log)	M	25	-4.0 ns	10.7***	cc	0.041	0.143	Controls: Race/ethnicity, work experience, job tenure, unemployment rate, postsecondary education	table 9
Cameron and Heckman (1993)	annual hours (log)	M	28	5.4ns	15.4***	cc	-0.053	0.090		
Cameron and Heckman (1993)	annual hours (log)	M	25	6.0ns	19.6***	cc	-0.058	0.121	Controls: AFQT	table 10
Cameron and Heckman (1993)	annual hours (log)	M	28	16.2*	27.1***	cc	-0.150	0.090		
Reder (1994)	weeks worked	M	16-64	-8.6 ns	20.0*				Ftn. 1	
Cameron (1994)	annual hours (log)	F	25	-6.7 ns	20.3***	cc	0.069	0.254	Controls: Kids in household, toddler present, baby present, 2 years of college interacted with GED and diploma, college graduate, spouse present, spouse, income, local unemployment rate, age effects.	table 11
Cameron (1994)	annual hours (log)	F	28	-13.5 ns	18.4**	cc	0.145	0.314		
Cameron (1994)	annual hours (log)	F	30	-3.5 ns	23.5**	cc	0.036	0.247		
Cameron (1994)	annual hours (log)	F	25	-1.9 ns	19.0***	cc	0.019	0.193	Controls: AFQT	table 12
Cameron (1994)	annual hours (log)	F	28	-10.1ns	19.1***	cc	0.107	0.282		
Cameron (1994)	annual hours (log)	F	30	-2.1 ns	22.8**	cc	0.021	0.226		

Table B–6.—Labor market outcomes for GED recipients, high school graduates, and dropouts: Simple and controlled comparisons (continued)

Outcome/Author	Measure	Male/ Female	Difference (Percent)* Age or year	Dropout vs. GED	HSG vs. GED	Dropout Mean or Coeff	GED Mean or Coeff	Diploma Mean or Coeff	Exclusions/ Controls	Table or page
Time Worked										
Controlled Comparisons (continued)										
Maloney (1993)	annual hours	F	1988	-13.8**	13.0**	cc	0.149	0.271	Controls: Race/ethnicity, urbanicity, region, health, local unemployment rate, work experience, job tenure, ASVAB, age, age squared, residence with parents, marital status, number and age of children, household nonlabor nontransfer income, spouse's earn	table 5
Maloney (1993)	annual hours	F	1988	-1.6 ns	5.9**	cc	0.016	0.073		table 6
Cao et. al (1993)	annual hours	F	22-29	-2.4 ns	2.5 ns	-79.1	-39.8	cc	Ftn. 8	table 4A
Cao et. al (1993)	annual hours	F	22–29	-1.6 ns	1.7 ns	-53.8	-27.6	cc	Ftn. 8 + yrs. schooling	table 4B
Cao et. al (1993)	annual hours	F	22–29	0.3 ns	2.4 ns	-33.6	-38.1	cc	Ftn. 8 + AFQT	table 4C
Reder (1994)	weeks worked	F	16–64	-21.5 ***	38.5 ***				Ftn. 1	
Cameron (1992)	hrs. per week (log)	F	25	-6.7	20.3	cc	0.069	0.254	Ftn. 6	table 12
Cameron (1992)	hrs. per week (log)	F	28	-13.5	18.4	cc	0.145	0.314	Ftn. 6	table 12
Cameron (1992)	hrs. per week (log)	F	30	-3.5	23.5	cc	0.036	0.247	Ftn. 6	table 12
Reder (1994)	weeks worked	Ad	16-64	ns	sig				Ftn. 1	
Work Experience										
Simple Comparisons										
Cameron and Heckman (1993)	Total (weeks)	M	25	15.1	21.4	243	211	256		table 5
Cameron and Heckman (1993)	Total (weeks)	M	28	21.5	24.2	355	293	363		table 5
Cameron (1994)	Total (weeks)	F	25	-38.4	27.5	130	212	270		table 7
Cameron (1994)	Total (weeks)	F	25	-38.6	24.0	130	212	263	Excl: >12 yrs. ed.	table 7B
Cameron (1993)	Total (weeks)	F	28	-37.5	34.5	170	273	367		table 6B
Cameron (1993)	Total (weeks)	F	28	-37.0	27.3	170	271	344	Excl: >12 yrs. ed.	table 6B
Maloney (1993)	Total (years)	F	1,988	-30.6	33.3	2.5	3.6	4.8		table 1
Job Tenure										
Simple Comparisons										
Cameron and Heckman (1993)	weeks	M	25	28.2	44.5	96	75	109		table 5
Cameron and Heckman (1993)	weeks	M	28	42.4	82.8	130	91	167		table 5

Table B–6.—Labor market outcomes for GED recipients, high school graduates, and dropouts: Simple and controlled comparisons (continued)

Outcome/Author	Measure	Male/ Female	Difference (Percent)* Age or year	Difference (Percent)* Dropout vs. GED	Difference (Percent)* HSG vs. GED	Dropout Mean or Coeff	GED Mean or Coeff	Diploma Mean or Coeff	Exclusions/ Controls	Table or page
Job Tenure										
Simple Comparisons (continued)										
Cameron (1994)	weeks	F	25	-2.2	58.8	68	70	111		table 7A
Cameron (1994)	weeks	F	25	-6.8	69.2	68	73	124	Excl: Not working, >12 yrs. ed.	table 7B
Cameron (1993)	weeks	F	28	-15.9	62.7	81	96	157		table 6B
Cameron (1993)	weeks	F	28	-19.7	65.7	81	101	167	Excl: Not working, >12 yrs. ed.	table 6B
Annual Earnings										
Simple Comparisons										
Cameron and Heckman (1993)	'88 $	M	25	-11.9	29.2	10,379	11,777	15,214	Excl: 2 or more year of higher education	table 5
Cameron and Heckman (1993)	'88 $	M	28	-10.8	45.1	12,412	13,922	20,196		table 5
Alsalam et. al (1993)	1993 $ (median)	M	25–33 in 1990	-6.5	31.4	17,822	19,066	25,048	Excl: Diploma or GED age 20 or or after. Those with 2 or more years of college	table 34–1
Alsalam et. al (1993)	1993 $ (median)	M	25–33 in 1990	-1.4	11.8	17,822	18,069	20,202	Excl: Diploma or GED before age 20. Those with 2 or more years of college	table 34–1
High School and Beyond	1991 $	M	27 approx.	-5.8	28.4	18,040	19,158	24,591	All 1980 Sophomores	tabulation
Smith et. al. (1995)	1992 $	M	16–64	-16	3.8	18,194	21,672	22,494	Diploma graduates exclude those with any college.	table 31–1 table 5,
Cave and Bos (1995)	1988–93 $ (2 years)	M		-19**		13,286	16,318			panel 2
Alsalam et. al (1993)	1993 $ (median)	F	25–33 in 1990	-29.1	10.5	9,895	13,955	15,415	Excl: Diploma or GED age 20 or after. Those with 2 or more years of college	table 34–1
Alsalam et. al (1993)	1993 $ (median)	F	25-33 in 1990	-17.1	9.8	9,895	11,929	13,103	Excl: Diploma or GED before age 20. Those with 2 or more years of college	table 34–1
High School and Beyond	1991 $	F	27 approx.	-28.7	58.5	7,768	10,902	17,277	All 1980 Sophomores	tabulation
Smith et. al (1995)	1992 $	F	16–64	-5.2	15.3	11,145	11,754	13,554	Diploma graduates exclude those with any college.	table 31–1
Cave and Bos (1995)	1988–93 $ (2 years)	F		-27.1**		5,994	8,220			table 5, panel 2
Sum (1996)	1992 $ (mean)	Ad	16–65	-30.7	11.7	10,440	15,070	16,840	Excl: Not employed	table 5, panel 2
Cave and Bos (1995)	1988–93 $ (2 years)	Ad		-20.2	**		9,405	11,788		

Table B–6.—Labor market outcomes for GED recipients, high school graduates, and dropouts: Simple and controlled comparisons (continued)

Outcome/Author	Measure	Male/ Female	Difference (Percent)* Age or year	Dropout vs. GED	HSG vs. GED	Dropout Mean or Coeff	GED Mean or Coeff	Diploma Mean or Coeff	Exclusions/ Controls	Table or page
Annual Earnings										
Controlled Comparisons										
Sum (1996)	log annual	M	16–64	-13.2	14.7	-0.279	-0.147	cc	Same as above	appendix 7B p. 255
Cave and Bos (1995)	1988–93 $ (2 years)	M		-28.9 ns		12,955	18,221			table 6, panel 2
Sum (1996)	log annual	F	16–64	-21.1	5.9	-0.270	-0.059	cc	Same as above	appendix 7B p. 255
Cave and Bos (1995)	1988–93 $ (2 years)	F		-54.0 ns		5,113	11,117			table 6, panel 2
Sum (1996)	log annual	Ad	16–64	-15.2	10.0	-0.252	-0.100	cc	Control: Prose proficiency, educational attainment, race/ethnicity, marital status, disability, enrollment status, region of residence. Excl: Not employed	appendix 7B p. 256
Cave and Bos (1995)	'88-'93 $ (2 years)	Ad		-34.0 ns		8,985	13,605			table 6, panel 2

NOTE: Simple comparisons are ones that make no adjustments for differences between the groups in characteristics that could influence labor market outcomes. The controlled comparisons make statistical (regression) adjustments for variables such as race, parent's education, and so forth. In many cases the population has been restricted to, for example, persons who did not complete any postsecondary education. The restriction in effect controls for the effect of any postsecondary education on earnings. The restriction also eliminates any indirect effect of high school completion status on earnings through postsecondary education.

* The difference between percents or proportions is expressed as percentage points. Other differences are expressed as percentages.

Control Variables

[1]A measure of functional literacy, level of parent's education, literacy material available in the home, years in occupation, age, and squared age. Reder's coding of the contrasts do not fit the format of this table

[2]Prose literacy, gender, race/ethnicity indicators, enrollment status, region of residence, marital status, whether born abroad, whether having lived in U.S. more or less than 5 years, disability status.

[3]Enrolled in school in 1985. Gender, race, ever married, ever attended college, and region of residence.

[4]Those with up to two years of college. Race/ethnicity, weeks worked, unemployment rate.

[5]Race/ethnicity, work experience, job tenure, unemployment rate, postsecondary education, AFQT.A140+A94

[6] Year. college, race/ethnicity, unemployment rate, spouse's income, number and age of children.

[7] Race/ethnicity, urbanicity, region, health, local unemployment rate, work experience, job tenure, ASVAB, age, age squared, residence with parents, marital status, number and age of children, household nonlabor nontransfer income, spouse's earnings

[8]Race, region, 2-years of higher education completed interacted with high school completion status, and 4 years of education completed

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Table B–7.—Effects of years of schooling, higher education, and cognitive skills on wages

Outcome/Author	Measure	Male/ Female	Age or year	Difference (Percent)* Dropout vs. GED	Difference (Percent)* HSG vs. GED	Dropout Mean or Coeff	GED Mean or Coeff	Diploma Mean or Coeff	Exclusions/ Controls	Table or Page
Years of Schooling										
Cameron and Heckman (1993)	log hourly wage	M	25	1.6	0.7	cc	-0.02	-0.01	Yrs. HS	table 15
Cameron and Heckman (1993)	log hourly wage	M	28	-1.5	6.7	cc	0.02	0.08	Yrs. HS	table 15
Murnane et al. (1995)	log hourly wage	M	1991	-2.0	-2.0	cc	0.02		Yrs. HS	table 2
Cameron (1994)	log hourly wage	F	25	-9.7	9.1	cc	0.10	0.19	Yrs. HS	table 8
Cameron (1994)	log hourly wage	F	28	-7.8	16.2	cc	0.08	0.23	Yrs. HS	table 8
Cameron (1994)	log hourly wage	F	30	-6.7	18.4	cc	0.07	0.24	Yrs. HS	table 8
Cao et. al (1993)	hourly wage	F	22–29	-1.50	-0.33	cc				table 4A
Cao et. al (1993)	hourly wage	F	22–29	-0.47	0.13	cc			Yrs. HS	table 4B
Higher Education										
Cameron and Heckman (1993)	hourly wage (88 dollars)	M	25	-6.7	16.2	6.84	7.33	8.52	w/o postsec. completion	table 5
Cameron and Heckman (1993)	log hourly wage	M	25	-5.8	8.8	cc	0.06	0.14	with postsec. completion	table 6, 9.
Cameron and Heckman (1993)	hourly wage (88 dollars)	M	28	-10.9	21.2	7.51	8.43	10.22	w/o postsec completion	table 5
Cameron and Heckman (1993)	log hourly wage	M	28	-6.0	11.9	cc	0.06	0.17	with postsec. completion	table 9
Garet, Jing, & Kutner (1996)	log hourly wage	M	28	-5.4	1.2	cc	0.06	0.07	GED/HSG plus some college.	table 17A
Garet, Jing, & Kutner (1996)	log hourly wage	M	28	-9.7	-2.0	cc	0.10	0.08	GED/HSG plus 2 yrs. college.	table 17A
Cameron (1994)	hourly wage	F	25	-11.1	19.1	6.19	6.96	8.29		table 7A
Cameron (1994)	log hourly wage	F	25	-9.7	9.1	cc	0.10	0.19	Exclu: >12 yrs. education	table 8
Cameron (1992)	hourly wage	F	28	-9.7	34.0	6.32	7.00	9.38		table 6B
Cameron (1994)	log hourly wage	F	28	-7.8	16.2	cc	0.08	0.23	Exclu: >12 yrs. education	table 8
Maloney (1991a)	hourly wage	F	1985	-10.7	8.9	4.50	5.04	5.49	Exclu: >12 yrs. education	table 1
Maloney (1993)	Hourly wage (88 dollars)	F	79-87	-10.7	6.3	4.83	5.41	5.75	Exclu: >12 yrs. education	table 1
Maloney (1993)	hourly wage	F	1988	-10.7	6.3	4.83	5.41	5.75	Exclu: >12 yrs. education	table 1

Table B–7.—Effects of years of schooling, higher education, and cognitive skills on wages (continued)

Outcome/Author	Measure	Male/ Female	Age or year	Difference (Percent)* Dropout vs. GED	HSG vs. GED	Dropout Mean or Coeff	GED Mean or Coeff	Diploma Mean or Coeff	Exclusions/ Controls	Table or Page
Garet, Jing, & Kutner (1996)	log hourly wage	F	28	-3.0	5.7	cc	0.03	0.085	GED/HSG plus some college.	table 17A
Garet, Jing, & Kutner (1996)	log hourly wage	F	28	-23.7	-7.7	cc	0.27	0.19	GED/HSG plus 2 yrs. college.	table 17A
Cameron and Heckman (1993)	log hourly wage	M	25	-5.8	8.8	cc	0.06	0.14	w/o AFQT	table 6, 9.
Cameron and Heckman (1993)	log hourly wage	M	28	-6.0	11.9	cc	0.06	0.17	w/o AFQT	table 9
Cameron and Heckman (1993)	log hourly wage	M	25	3.9	7.3	cc	-0.04	0.03	with AFQT	table 10
Cameron and Heckman (1993)	log hourly wage	M	28	2.0	10.5	cc	-0.02	0.08	with AFQT	table 10
Cameron (1994)	log hourly wage	F	25	-9.7	9.1	cc	0.10	0.19	w/o AFQT	table 8
Cameron (1994)	log hourly wage	F	28	-7.8	16.2	cc	0.08	0.23	w/o AFQT	table 8
Cameron (1994)	log hourly wage	F	30	-6.7	18.4	cc	0.07	0.24	w/o AFQT	table 8
Cameron (1994)	log hourly wage	F	25	-3.5	6.4	cc	0.04	0.10	with AFQT	table 9
Cameron (1994)	log hourly wage	F	28	1.9	13.4	cc	-0.02	0.11	with AFQT	table 9
Cameron (1994)	log hourly wage	F	30	12.4	18.3	cc	-0.12	0.05	with AFQT	table 9
Garet, Jing, & Kutner (1996)	log hourly wage	M	28	-9.5	8.3	cc	0.10	0.18	w/o ASVAB	table 17A
Garet, Jing, & Kutner (1996)	log hourly wage	M	28	-4.5	5.5	cc	0.05	0.10	with ASVAB	table 17B
Garet, Jing, & Kutner (1996)	log hourly wage	F	28	-2.3	-4.6	cc	0.023	-0.024	w/o ASVAB	table 17A
Garet, Jing, & Kutner (1996)	log hourly wage	F	28	-0.5	-7.0	cc	0.005	-0.068	with ASVAB	table 17B
Maloney (1993)	log hourly wage	F		-3.2	5.0	cc	0.033	0.082	w/o ASVAB	table 3
Maloney (1993)	log hourly wage	F		0.2	4.2	cc	-0.002	0.039	with ASVAB	table 3
Cao et. al (1993)	hourly wage	F	22–29			-1.50	-0.33	cc	w/o AFQT	table 4A
Cao et. al (1993)	hourly wage	F	22–29			-0.47	-0.22	cc	with AFQT	table 4C

* Percentage differences.

APPENDIX C. TECHNICAL ISSUES

Appendix C. Technical Issues

Does the GED credential improve the labor market opportunities of those who hold it? In comparison to what? To what would have been the case if they had not prepared for, taken, and passed the GED Tests? To what would have been the case if they had graduated from high school? To show a GED effect, we need evidence of how well GED certificate holders are doing in the labor market compared to how they would have done had they not received the GED. To see whether any effects are equivalent to those of a high school diploma, we need to know how the GEDs would have done had they graduated from high school. These hypothetical conditions are termed "counter-factual," because they describe events that did not happen. The challenge for empirical research in dealing with such questions is to approximate the counter-factual condition. Possibilities include (1) comparing GED recipients to other individuals with similar characteristics who did not get the GED or who graduated from high school (cross-sectional evidence), and (2) the comparing the same individuals (and comparison groups) before and after they received the GED (longitudinal evidence). This study examines both cross-sectional and longitudinal evidence from large-scale national surveys.

Four types of survey sample data have been used to study the relationship between passing the GED Tests and labor market outcomes.

1. Follow-up Surveys of GED Test-takers or Passers

These might be called one-step longitudinal studies. There is usually no baseline survey, other than the administration of the test and collection of a modicum of background data at that time. A follow-up survey is conducted some time later. There are usually no additional follow-up surveys after the first one. The strength of these surveys is that they focus on the group of interest. For example, it is common for surveys to follow up individuals who took the GED Tests. However, most follow-up surveys do not include a comparison group. Therefore, inferring the effect of taking the GED can only be done by comparing the GED examinee's status before and after taking the GED. The problem with this approach is that it is normal for individuals to get promotions and salary increases. There is no benchmark or basis for estimating how well the GED test-takers would have done if they had not taken the GED. A variation is to ask the recipients to provide their own judgments about whether getting the GED caused an improvement in employment. This approach is problematic because GED test-takers may not be a reliable source for this judgment.

2. Panel Surveys

These include (1) the National Longitudinal Survey of the Labor Market Experiences of Youth (NLSY), (2) High School and Beyond (HS&B), (3) the National Education Longitudinal Study of Eighth Graders in 1988 (NELS), (4) the

Beginning Postsecondary Student Longitudinal Study (BPS), and (5) the October Current Population Survey.

These surveys provide good data for before-and-after comparisons and they avoid recall bias. Respondents are asked about items such as employment, hours worked, weeks worked, salaries, and earnings for the current week or the past year and then surveyed again in one, two, or more years and asked the same questions again. Most longitudinal surveys also provide a rich array of control variables such as measures of academic achievement, family background information, labor force experience, and so forth. They offer as comparison groups both high school graduates and individuals who dropped out of high school and did not get a GED. As was noted for follow-up surveys, labor market rewards typically improve with age and experience. To isolate the effects of the GED from the effects of age and experience requires that they be modeled correctly. An alternative comparison group is high school graduates. This group includes many who went on to postsecondary education and may differ from GEDs in ways related to postsecondary education. Therefore in making comparisons, it is important to exclude those with college experience or control for level of education after high school. Some longitudinal studies, such as the NLSY, follow individuals for 12 or more years. This allows time to measure such differences between GED recipients and other dropouts in, for example, the growth of wage rates.

3. Cross-Sectional Surveys

The strength of cross-sectional surveys is that they typically offer a wide age distribution and a wide range of post-GED periods of time in the labor market. The National Adult Literacy Survey (NALS), for example, is a sample of individuals 16- to 64-years-old who may have taken the GED over a period as long as 40 years. A cross-sectional study provides comparison groups similar to longitudinal studies. However, labor market outcomes are available at only one point in time, and of course, people's labor market experiences vary over time.

4. Experiments

Studies that use any of the three types surveys discussed above, including longitudinal studies, are plagued by the fact that there may be differences, that are important for labor market outcomes, between those who take and pass the GED Tests and those who do not and that are not reflected in the long list of variables available to the analyst. Experiments through randomization provide a means of controlling for the unmeasurable differences between those who get a GED and those who do not. Social experiments are usually difficult to conduct, because researchers can neither force individuals to participate who do not want to nor can they prevent individuals from participating who do want to (and are eligible). However, researchers have taken advantage of the fact that there are sometimes more applicants than a program can accommodate, and a fair way to decide who gets in is through random selection. This makes it possible to

compare the experiences of program participants with other similar people who also wanted to participate but who were denied access just by chance. Another way of conducting an experiment, in this case a "natural experiment," is to compare outcomes for similar categories of individuals who can be separated into treatment and control groups by virtue of systematic coincidences, such as laws and rules of states they happen to live in. One experiment that considered GED outcomes was based on random selection among applicants (Cave and Bos 1995). Another compared outcomes for GED test-takers in states with different standards for passing the test (Tyler et al. 1997).

APPENDIX D. GED FOLLOW-UP SURVEYS

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In Fall 1981, Cervero and Peterson (1982) conducted a national survey of successful GED candidates who had first taken the tests in the Spring of 1980. Like most of the GED follow-up surveys, this one had a low response rate and methodological shortcomings that caused the authors to urge caution in generalizing from the data.[66] The study found that 18 months after taking the tests, approximately 60 percent of the respondents were employed full-time or part-time, and approximately 40 percent were out of the labor market or unemployed.[67] Nevertheless, the proportion of GEDs working full-time for pay increased from 39 to 48 percent in those 18 months. All other employment status categories (e.g., unemployed, not in the labor force) fell between 1 and 3 percentage points. The perceived results of taking the GED were not as great as expected, but a significant proportion of respondents thought the tests had helped them. For example, 52 percent said it had helped them qualify for a job and 20 percent said it had helped them win a job promotion.

Kroll and Qi (1995) conducted another national follow-up survey, in this case of examinees (rather than just GED recipients). As in the previous study, there were methodological problems that caused the authors to advise against generalizing from the data.[68] Among the strengths of this study was the fact that it provided both before and after measures and GED/non-GED comparisons. The results of the Kroll and Qi survey were rather similar to those of Cervero and Peterson. For example, they found that 2 years after taking the test, 61 percent of their respondents were employed full-time or part-time, and 39 percent were out of the labor market or unemployed. Their data also suggest some labor market benefits of GED test taking. Among GED recipients, those who had their current jobs before taking the tests reported post-test hourly wages that were 14 percent higher than pretest wages. Comparable GED examinees who did not pass the test had a 10 percent increase. GED recipients who got new jobs after the test (jobs that did not require a GED) had wages 17 percent higher than before, while their unsuccessful GED counterparts saw only a 3 percent increase. Finally, GED recipients who got new jobs that required GED certification reported wages that were 24 percent higher than their previous wages; for this group there could be no nonGED comparison.[69]

Several state and local follow-up surveys used similar methods and also reported GED benefits. For example, the Iowa Department of Education (1992) surveyed GED recipients two, five, and ten years after their completion of the tests in 1980, 1985, and 1988. Controlling for inflation, reported personal income of GED graduates declined 6 percent between the time of passing the tests and the survey administration in 1990, while the mean income of all Iowans declined 10 percent between 1980 and 1990. (The comparison with all Iowans would have been better had it been limited to the GED 1980 cohort.)

In 1981, Moore (1982) surveyed both successful and unsuccessful candidates for the GED in Kentucky five years after they had taken the tests. Again, there were methodological problems, including a 28 percent response rate among successful GEDs in the sample and a very low 15 percent rate among the unsuccessful candidates. Moore's data show that successful GED candidates who responded to the survey were more likely to report before and after improvement in employment status (54 percent) than were unsuccessful candidates (30 percent).

Eight state or local follow-up surveys collected data on the employment status of GED recipients before and after they earned their credentials. In all eight of these studies we have data on two important status variables—full-time employment and unemployment (table D–1). On average, across the 8 studies, the full-time employment rate of GEDs increased from 46.1 percent before certification to 57.0 percent afterward. In two of the studies (Darkenwald and Valentine 1985 and Iowa Department of Education 1992) GED full-time employment rates increased substantially more than statewide rates over the periods in question. The average GED unemployment rate across the 8 studies fell from 18.6 percent to 14.3 percent.

Table D–1.—Employment status of GED recipients

Author, GED employment status	Percentage rate: Before At time of testing	Percentage rate: After At time of survey
Reed 1985, Maryland		
Employed full-time	40	54
Unemployed, looking	23	18
Carbol 1985, Alberta		
Employed full-time	53	58
Employed part time	13	12
Unemployed, looking	16	15
Unemployed, not looking	8	3
Darkenwald & Valentine 1985, New Jersey		
Employed full-time	31	49
Employed part time	21	16
Unemployed, looking	35	22
Unemployed, not looking	14	14
Goodwin 1991, New York		
Employed full-time	46	42
Employed part-time	13	14
Unemployed, looking	12	16
Not in labor force	27	28
Hayes 1991, Wisconsin		
Employed full-time	43	49
Employed part time	16	18
Unemployed, looking	15	13
Unemployed, not looking	24	17
Iowa Department Education 1992		
Employed	54	71
Unemployed, looking	19	9
Martin 1992, Wisconsin		
1986 GEDs in 1990		
Employed full-time	53	73
Employed part-time	19	12
Unemployed, looking	12	9
Unemployed, not looking	16	6
Martin 1992, Wisconsin		
1989 GEDs in 1990		
Employed full-time	49	60
Employed part-time	19	12
Unemployed, looking	17	12
Unemployed, not looking	16	15

NOTE: Martin's employment rates have been recalculated. Martin's rates for 1986 and 1989 used the same sample base, but the item nonresponse rate (the percentage of survey items not answered) seems to have been much higher for reports of employment status before the test than for current employment status. Using the entire sample as a base provided an inflated denominator for calculating employment rates before the test, thereby making pretest rates look much lower than they must have been. Here rates have been recalculated based on number of respondents to each question.

SOURCE: Studies in this table.

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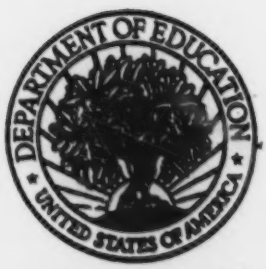

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